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A Taxonomic Revision of the Palm Bruchids (Pachymerini) and a Description of the World Genera of Pachymerinae (Coleoptera: Bruchidae)

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ABSTRACT—The genera and species of the New World tribe Pachymerini (the palm bruchids) are revised, and the world genera of the Pachymerinae are described. The new genus *Speciomerus* Nilsson is established, the genus *Butiobruchus* Prevett is synonymized with *Pachymerus* Thunberg, and 3 new species are described: *Caryoborus gracilis* Nilsson, *Caryobruchus maya* Nilsson, and *Pachymerus sveni* Nilsson. New combinations are given to 5 species, while 1 genus name and 12 species names are synonymized. A neotype is designated for *Bruchus curvipes* Latreille. The following 20 species of New World Pachymerinae are considered to be valid: *Caryoborus chiriquensis* Sharp, *C. gracilis* Nilsson, new species, *C. serripes* (Sturm), *Caryobruchus curvipes* (Latreille), *C. gleditsiae* (Johansson and Linné), *C. marieae* Nilsson and Johnson, *C. maya* Nilsson, new species, *C. rubidus* (Chevrolat), *C. veseyi* (Horn), *Speciomerus giganteus* (Chevrolat), new combination, *S. revoili* (Pic), new combination, *S. rubrofemoralis* (Pic), new combination, *S. ruficornis* (Germar), new combination, *Pachymerus abruptestriatus* (Gyllenhal), *P. bactris* (Linné), *P. bridwelli* (Prevett), new combination, *P. cardo* (Fåhraeus), *P. nucleorum* (Fabricius), *P. sveni* Nilsson, new species, *P. thoracicus* Prevett. Keys to subfamilies, tribes, genera and species are presented, critical morphological characters are illustrated and Arecaceae host plants are reported. Distribution maps are presented for all species.

INTRODUCTION

Most Bruchidae are small and all feed in the seeds of plants. Less than 10% of these seed beetles are of economic importance. They are closely related to the Chrysomelidae, the leaf beetles. The body is often egg-shaped, that is broadest toward the rear or the middle. The head is frequently concealed from above, and prolonged into a short beak. The hind femur is usually enlarged dorso-ventrally (incrassate), often with spines or denticles on the ventral margin. The antennae are often club-shaped with 11 segments, often serrate or pectinate. The eyes are often notched (ocular sinus), the elytra are striate (each elytron has 10 striae), and the pygidium is often exposed (White 1983). All known Bruchidae spend their larval period in the seeds or fruits of plants, and are often specific to seeds of certain plant species or genera (Johnson and Slobodchikoff 1979). Females oviposit on a seed or a pod, the larvae then burrow into a seed, feed inside a seed or several seeds, usually pupate inside a seed, and the adults emerge through an exit hole.

The host plants of many bruchids are unknown, and the delimitation of plant families varies with different taxonomists. According to Johnson (1985) about 85% of the investigated host plants are in the legume family, Fabaceae, 4% are in the palm family, Arecaceae, 4% in the morning glory family, Convolvulaceae, and 2% in the mallow family, Malvaceae. The remaining 5% are in 29 other families (Borowiec 1987; Johnson 1981, 1985) (Table 1).

Bruchids in the subfamily Pachymerinae are medium to large size plant seed predators consisting mainly of so called primitive forms. They appear to be naturally distributed in the tropics and subtropics of all continents except Australia, and extend into temperate zones in some areas. The Old World pachymerines are only reliably reported to feed in Leguminosae and Combretaceae, while the tribe Pachymerini of New World origin almost exclusively uses palms as host plants and are therefore commonly called palm bruchids. The only known exception is *Pachymerus abruptestriatus* (Gyllenhal) which uses a non-palm, *Diospyros* sp. (Ebenaceae), as a host (Bondar 1941, 1943). Although palms are of economic importance, little is known about the insects that feed in their seeds, and only a few host associations are known.

Most of the studies on bruchids have been done on species in the largest subfamily Bruchinae, which feeds mostly in legumes. Patterns obtained from research on Bruchinae cannot be automatically extrapolated to the Pachymerinae, since the pachymerine bruchids are only distantly related to the Bruchinae.

Very little ecological research has been done on the Pachymerinae, even though relationships between bruchid beetles and their hosts usually are more readily studied than are many other insects and their host plants. Palms are, however, usually an exception to this, being much more difficult to collect because of the height of many palm trees. The limited knowledge we have about the biology of the palm bruchids has mostly been learned through studies of their palm hosts (Janzen 1971, 1972; Wilson and Janzen 1972; Smith 1975; Bradford and Smith 1977; Wright 1983; Smythe 1989). One reason for the lack of ecological research is the problem of identification. With this revision, identification problems are clarified for the New World species.

The palm bruchids appear to be nocturnal insects because they are often captured in ultraviolet light traps. Also, captive beetles in the laboratory hide during daylight hours inside hollow palm fruits and come out only at night or in a dark room. In the laboratory, palm bruchids also seem to have only one generation per year, and the developmental time for the larvae in the seeds, compared with other bruchids, seems to be much longer. The normal developmental time for *Stator beali* Johnson (Bruchinae) is about one month, while for *Caryobruchus gleditsiae* (Johansson and L.) (Pachymerinae) it is six months or longer. It is not known if any of the Old World pachymerines in the tribes Caryedini and Caryopemini also use palms as hosts, but some are pests of legumes such as peanut (Davey 1958; Prevett 1966b) and tamarind (Davey 1958; Johnson 1966, 1986; Nilsson and Johnson 1992; Vélez Angel 1972).

TAXONOMIC HISTORY

Studies of the pachymerines (Bridwell 1929; Prevett 1966b) are few and incomplete. Thirty-four species names of palm bruchids have been published. Linné (1762) described *Dermestes bactris* in a letter to N.J. Jacquin who subsequently published Linné's description in a footnote with his description of the host palm *Bactris minor* (Jacquin 1763). Another pachymerine species, *Dermestes gleditsiae*, was mentioned in Linné's letter and compared with *D. bactris* but a printed description of this species was not done until Johansson described it along with a redescription of *D. bactris* in his dissertation (Johansson 1763). A formal publication of these two species in the genus *Dermestes* was also published after the death of Linné (Johansson and Linné 1763, published 1789). The letter with the original description of *D. bactris* was later published together with Linné's other correspondence to Jacquin by Schreibers (1841). Prior to both these dates Linné proposed and published the genus *Bruchus* in which he placed both species (Linné 1767a, b).

Fabricius (1792) redescribed *Bruchus bactris* and also described the new species *Bruchus nucleorum* from specimens first misidentified by Herbst (1783) as *B. bactris*. Fabricius also described *Bruchus gonagra* (1798) and *Bruchus arthriticus* (1801), but ignored

Bruchus gleditsiae. Fabricius and the other students of Linné did not have Linné's collection on which to base new descriptions and redescriptions. After the death of Linné, the collection was first owned by Linné's son. In 1783 it was sold to a private collector in the United Kingdom and in 1828 to the Linnean Society in London (Usinger 1974). Since then the collection has been treated more as if the insects were expensive jewels rather than insects for scientific study.

Latreille (1802) added the category family to the hierarchial system implemented by Linné and placed *Bruchus* with *Anthribus* in a family he named Bruchèlae. The family name was corrected to Bruchidae by Leach (1814) and *Anthribus* was removed by Thunberg (1816).

After *Bruchus* was proposed (Linné 1767a), all seed beetles were placed in this genus until Thunberg (1805) transferred *B. bactris* (L.) to the new genus *Pachymerus.* This new genus name was ignored by other workers until Pic (1913) used it again. Thus, descriptions of *Bruchus curvipes* Latreille (1811), *B. ruficornis* Germar (1818a) and *B. serripes* Sturm (1826) were all described as *Bruchus.*

Latreille (1825) used the name Pachymere (vernacular name) and ignored *Pachymerus* Thunberg (1805). He named Pachymere as if it were a new genus and designated *Bruchus brasiliensis* Thunberg as type of the genus. Schönherr (1833) placed *Bruchus* in the family Curculionidum and divided the genus into several groups. He followed Latreille (1825) and placed some species in grex (subgenus) *Pachymerus* (Pachymere Latreille 1825, not *Pachymerus* Thunberg 1805) and some in the new subgenus *Caryoborus.* This name became the accepted name for all "palm bruchids" until Pic (1913) rediscovered *Pachymerus* Thunberg (1805). *Bruchus bactris*, the type of *Pachymerus* (Thunberg 1805) and *B. serripes* Sturm, the type of the genus *Caryoborus*, are distinct species so both genera are valid.

Fåhraeus (1839) described *Bruchus cardo* and Gyllenhal (1839) described *B. abruptestriatus.* Both were placed in the subgenus *Caryoborus* by Schönherr (1839). Horn (1873) described *Caryoborus veseyi*, separated *Caryoborus* from *Bruchus* and elevated it to the generic level.

Several descriptions of new taxa followed. Motschoulsky (1874) described *Caryaborus (sic) testaceus*, misspelling the genus name. Chevrolat (1877) described *Caryoborus giganteus*, *C. priocerus*, *C. lacerdae*, *C. luteomarginatus*, *C. rubidus*, and *C. recticollis.* Sharp (1885) described *C. chiriquensis.* Pic described *C. rubrofemoralis* and *C. donckieri* in 1899 and *C. revoili* and *C. sparsepunctatus* in 1902.

Pic (1913) transferred all "palm bruchids" described until then to *Pachymerus* Thunberg (1805) and invalidated the name *Pachymerus* Latreille (1825). The name *Pachymerus* Latreille was changed to *Pseudopachymerus.* Bridwell (1932) synonymized *Pseudopachymerus* Pic with *Caryedes* Hummel, and placed it in the subfamily Bruchinae.

In all, 22 species were described up to and including Pic (1913). Most of these descriptions appear to have been done without study of types and without comparing them with other species. Bridwell (1929) did the first modern study but his work was also done without the study of types and limited to comparing material at the U.S. National Museum with original descriptions. Bridwell established the new genus *Caryobruchus* and the subfamily Pachymerinae which he divided into the three new tribes Pachymerini (after *Pachymerus* Thunberg), Caryedini (after *Caryedon* Schönherr) and Caryopemini (after *Caryopemon* Jekel). These names follow the recommendations in the International Code of Zoological Nomenclature (ICZN 1985). Decelle (1966) changed two of the tribe names to Caryedontini and Caryopemontini. However, the correct stems of the Pachymerinae tribes are Pachymer-, Caryed-, and Caryopem-. To these stems should be added -ini (ICZN 1985). Therefore Caryedontini and Caryopemontini are unnecessary changes of the original names given by Bridwell. We follow Bridwell and use the original names.

Bridwell placed all species commonly called "palm bruchids", the genera *Pachymerus, Caryoborus* and *Caryobruchus*, in the Pachymerini. The distribution of these is limited to the New World. He discussed the Old World tribes but did not mention any species. He primarily studied beetles in the New World genus *Caryobruchus* and described the species *C. scheeleae*, *C. lipasmatus*, *C. buscki*, *C. acrocomiae*, *C. pararius*, and *C. pergandei.* Most of these new species were described from only one or two specimens.

Only a few new species have been described since Bridwell's (1929) paper. Bondar (1941) described *Pachymerus diospirosi.* Kingsolver (1965) described a new fossil genus *Oligobruchus* which he placed near *Pachymerus.* This fossil genus was not studied and is not included in the revision. Nilsson (1992) stated that based on a study of the original description, *Oligobruchus* is closer to *Caryopemon* Jekel than to *Pachymerus*. Decelle (1966) transferred *Bruchus fuscus* Goeze to *Caryobruchus* and preliminarily placed it with *Dermestes gleditsiae*. Prevett (1966a) proposed and described the new genus *Pachymeroides* and the species *P. bridwelli*.

The second modern study of the palm bruchids is Prevett's (1966b) systematic notes on the genus *Pachymerus*. This appears to be the first work where types were studied. He changed, in a footnote, the name *Pachymeroides*, preoccupied in the Hemiptera, to *Butiobruchus*. He also proposed a neotype for *Bruchus bactris* (although a neotype was needed, the name is incorrect because the correct type name is *Dermestes bactris*). He also described the new species *Pachymerus thoracicus*.

Silva (1979) discussed the distribution of the host plant of *Pachymerus thoracicus* Prevett. Borowiec (1987) discussed taxonomic characters of *Pachymerus*, *Caryoborus* and *Caryobruchus* in his worldwide treatment of bruchid genera. Udayagiri and Wadhi (1989) list all Bruchidae in their catalog, but much of the information about the Pachymerinae is outdated. Nilsson and Johnson (1990) redescribed *C. gleditsiae* and described *Caryobruchus marieae*.

Because of the confusion between *Pachymerus* Thunberg and *Pachymerus* Latreille, for many years both non-pachymerine and pachymerine bruchids were included in the genera *Caryoborus* or *Pachymerus*. Most of these were correctly placed by Pic (1913), but some still remain in *Caryoborus* or *Pachymerus* because they have not been studied since they were described.

The purpose of this study is to revise the New World tribe Pachymerini and to describe the world genera of the subfamily Pachymerinae. A revision is necessary to make possible the correct identification of species of palm bruchids. This is especially important for agricultural inspectors at ports of entry, ecologists working with palms and tropical agriculture and silviculture workers.

All new taxa in this revision are to be attributed to Jan A. Nilsson.

MATERIALS AND METHODS

During this study 4231 specimens of Pachymerini were examined from 51 museum, private, or university collections. The numbers of specimens studied are in the treatment of each species. Many were old museum specimens without host associations and other ecological data. In addition to specimens of Pachymerini, several specimens of Caryedini and Caryopemini were also studied.

Host records are in the Specific Records section. Most host records are from collection labels, but a few beetles were reared in the laboratory. These were reared from palm fruits contained in glass canning jars covered by paper towels treated with 0.5-1% Kelthane® in acetone solution to prevent mite infestations (Johnson 1970). The paper towels were secured to the jars with metal ring caps. The jars were examined weekly for any bruchids that may have emerged.

All descriptions follow the same basic format and all species are described or redescribed. A Diagnosis with a brief listing of characters used to differentiate a particular species from related species is included before the detailed description or redescription. All species in a genus are compared and contrasted in a section following the last included species. If a species is new, a Differential Diagnosis follows the Diagnosis of that species (however, it is only a statement referring to the section following the last included species). Some terminology used is new (see MORPHOLOGICAL TERMINOLOGY below) and some follows *in part* that of Prevett (1966b) and Johnson and Kingsolver (1973). Kingsolver (1970) is followed for terminology of the male genitalia but several new structures are defined. Species names, genera and tribes are indexed.

All drawings were made by the first author. The illustrations for each species vary, depending on which characters are of importance. The hind leg and male and female genitalia are always illustrated. Due to the great similarity between species, the habitus is only illustrated for some species, but at least one habitus from each genus is illustrated. For some species additional structures are figured. Almost all parts used in the keys are figured. The same body parts are placed together for each genus to facilitate comparisons rather than putting all parts of one species together.

The male and female genitalia have very useful characters in the genus *Caryobruchus* but are of no taxonomic value in the genus *Pachymerus*. Genitalia were studied and drawings made, however, for all species in all genera. All specimens were relaxed in hot 70-80% alcohol for 3-10 minutes, depending on the condition and size of the specimens. The genitalia were removed by placing the beetles upside-down under a dissecting microscope on a piece of Styrofoam®. The beetles were held in place with dissecting forceps, the apex of the pygidium was opened with another pair of forceps, and the genitalia removed. Extracted genitalia were cleared of tissue by treatment in hot 10% potassium hydroxide (KOH) for about 2-6 minutes. Care was taken to assure that the genitalia were not kept too long in the KOH because this makes the genitalia transparent and of no use for identification. After the KOH treatment the genitalia were washed in alcohol, the parts stored in microvials with glycerin, and attached to a specimen pin.

The geographical distributions for each species are in a list of countries and sometimes also as states or provinces in the Distribution section, and as distribution maps (Figs. 1-6). For species that are in need of collecting all known collecting records are in the Specific Records section to aid future collectors. For species extensively collected only specific records with host associations are noted. If a record is judged to be from a quarantine without a specific collection locality or other place away from its natural habitat, but not so noted on the labels, the record is not included on the distribution maps.

The sexes in palm bruchids are morphometrically similar, some sexual dimorphisms exist, e.g., much longer femur in the male *Pachymerus bactris* (Linné), and in some species the males sometimes have a much wider protarsus. Taxonomically important length/width ratio means are in Table 2.

Only the New World tribe Pachymerini are revised. Some species that have been introduced to the Old World are mentioned. The Old World species *Caryedon serratus* (Olivier) (tribe Caryedini) has been reported introduced to the New World (Johnson 1966, 1986; Nilsson and Johnson 1992; Vélez Angel 1972) but is not included here.

In addition to the revision of the New World tribe Pachymerini, the Old World genera of the subfamily are described.

STRUCTURES OF VALUE AS TAXONOMIC CHARACTERS

Total length of body. The heads of bruchids are often at more than a 90° angle to the meson (Figs. 53, 54). The heads articulate with varying lengths of the vertex (Fig. 55) and the occiput (Fig. 55) hidden under the pronotal disk. For these reasons the measurements of total body length in bruchid literature has traditionally been the combined lengths of the elytron and the pronotum only. Because the space between the pronotum and the elytron varies depending on the position of the beetle, and the pronotum and the elytron are not in a horizontal plane, the measurements are done separately and then added.

Total width of body. Measured as the maximum width across the elytra. Due to variation in the resting position of the elytra, only one elytron width was measured and then multiplied by two to give the body width.

Maximum thoracic depth. Measured in lateral view from the basal mesal part of the elytra, to the basal mesal part of the mesosternum. The measurement is not a very reliable character because the elytra are often not in a flat resting position making an accurate measurement impossible. This is often the case, particularly in teneral beetles with swollen abdomens. Even if the insect is softened in alcohol it is difficult to put the elytra into a reliable position for measurement. This measurement is included because it is of some value when comparing the different genera, but not when comparing different species.

Integument. The integument in the pachymerine bruchids is usually moderately hirsute with rather fine setae (Fig. 7). Sometimes the setae have been removed, probably due to accidental rubbing (Figs. 8, 9). Since the base of each seta is set in a minute puncture, the integument is minutely punctulate where the setae have been removed. Very few structures are glabrous (as defined by Torre-Bueno (1989) p. 305: smooth, devoid of pubescence; devoid of any sculpturing). The color of the integument in the Pachymerini is very similar for all species in the tribe but with much intraspecific variability and therefore of limited use as a taxonomic character. Some exceptions are in the descriptions. The color is usually dark brown to almost black, or a modification of these colors, together with the addition of yellow and red on some body parts, especially the legs and the antennae.

Vestiture. With the exception of *Diegobruchus* Pic and *Caryopemon* Jekel, pachymerine bruchids appear brownish or blackish because the setae are not dense or coarse enough to cover the brownish or blackish integument. However, colors of the setae, especially on the dorsum, were found to be valuable characters to distinguish many species, especially in *Pachymerus*. To a limited extent the texture (fine, medium, coarse) can also be of some taxonomic value. Density of setae is not of much value since most Pachymerinae (Pachymerini and Caryedini) are homogeneous and have sparse setation. The arrangement of the setae is of some importance in separating two species where the disposition of the setae on the elytra along the striae gives an effect of alternating color (*Speciomerus ruficornis* (Germar) and *Pachymerus bactris* (Linné)). This effect is strongest to the naked eye and often is not clearly visible under the microscope. Some species have very small, fine setae, e.g., *Speciomerus rubrofemoralis* (Pic), so that the integument appears not to have setae and is difficult to see under a microscope.

Head. The important characters on the head vary between genera. The size and shape of the antennal segments are two of the most important characters to separate the species of *Caryobruchus* (Figs. 89-94) and *Caryoborus* (Fig. 95). The following characters are usually important: the length, size and height of the carina between the eyes (Figs. 53-55); the distance between the eyes on the dorsal side (following Prevett 1966b, the term approximate is used for a short distance between the eyes (Fig. 55) and distant for a long distance between the eyes (Fig. 53)); the distance between the eyes on the ventral side (approximate (Fig. 61) or distant (Fig. 58)); the size of the ocular sinus (Figs. 20, 53); the postocular lobe (Figs. 19, 20); the length and width of the 3rd segment of the maxillary palp (Figs. 53, 55); the total length of the head; and the shape of the submentum (Fig. 56). Bridwell (1929) and Prevett (1966b) used the term "gula" for the submentum. We are confident that the structure is the submentum (for discussion see MORPHOLOGICAL TERMINOLOGY).

Prothorax. *Disk.* Several important taxonomic characters are on the disk (Figs. 55, 67) which usually is feebly convex with the sides of the anterior margin depressed. Sometimes it is sharply depressed so that the angles (Fig. 53) are not visible in dorsal view. The shape of the anterior margin is often a good character to separate species. The length compared to the width of the disk (length/width ratio) is sometimes important to separate species, especially in *Pachymerus*. Bridwell (1929) separated several species of *Speciomerus* Nilsson (he placed these beetles in *Caryobruchus*) on the amount and location of the punctations (foveolations) found on the disk. The amount of punctations varies intraspecifically, and Bridwell only had one or two specimens of each species to study. Therefore, punctations are generally not useful to separate species. *Prosternal process.* The apex of the prosternal process (Figs. 46, 47) in the Pachymerini always completely separates the procoxae and the width (wide, medium or narrow) is an important species character. *First leg.* Protarsus 1 (tarsal segment 1 on the 1st leg) (Fig. 20) is often much shorter and wider than the metatarsus 1 (tarsal segment 1 on the hind leg) (Fig. 20). In *Speciomerus* and *Caryobruchus* protarsus 1 is sexually dimorphic, swollen in males but not in females.

Mesothorax and metathorax. *Scutellum.* Size and shape are sometimes useful characters to delimit higher taxa but rarely useful for species (Fig. 50). *Elytron.* The size is of taxonomic importance for higher taxa. The humerus (Fig. 12) is sometimes scabrous (Fig. 67), and even though there can be some intraspecific variation, the absence or presence of scabrosites is a good species character. The striae (Fig. 11) are almost identical in the palm bruchids, always ten lines of punctations and therefore usually not much use as taxonomic characters. Prevett (1966b) stated that in *Pachymerus abruptestriatus* (Gyllenhal) "the elytral striae are marked by shallow elongate-oval irregularly spaced punctures". This description fits all species in the Pachymerini. However, in this species the setae are dense and coarse and the immediate area surrounding the punctations (and inside the punctations) are without setae, so because of the contrast between the darker integument and the pale setae, the punctations in the stria appear very clear and distinct. Fine punctations can also be seen on the lateral side of the metafemur. The explanation is the same as for the strial punctations. *Metafemur.* This leg segment possesses several important characters (Figs. 68-90). It is incrassate, has a pecten (Figs. 23, 24) on the ventral side with different numbers of denticles, varying length and shape (straight or curved), and a prepectenal ridge (Fig. 24) with or without spines. The location of the first denticle on the pecten (Figs. 24, 36-38), which is usually larger and acuminate, and the length of the pecten (length/width ratio) and prepectenal ridge are important characters for species, genera and higher taxa. The lateral side of the metafemur has, in many species, fine punctations which are especially visible in *Pachymerus abruptestriatus*. *Metatibia.* The hind tibia of the Pachymerinae has 3-7 carinae (Figs. 24, 35, 36). The character state with many carinae (usually 4-6) is more common in the subfamily. In the New World only some *Pachymerus* sp. have 7 carinae, and the 7th is present only as a short remnant outer ventral carina (Figs. 24b, 86, 87), and *Caryoborus*, *Caryobruchus*, and *Speciomerus* have only 3 carinae. Only *Caryopemon* and *Diegobruchus*, two Old World Pachymerinae, have a complete set of 7 full length carinae. The length of these carinae is indicated as a percentage range from either the basal end or the apical end of the segment. Some carinae are strong at the apical end and then taper toward the basal end, while other carinae are strong at the basal end and taper toward the apical end. A carina may extend the full length of the tibia, but be weak over all its length or covered by setae and therefore hard to see. The shape of the bend of the tibia and the length of the mucro can also be of use. The two apical calcaria (Figs. 68-70) in the metatibial corona (dorsal side of the mucro) are found only in *Caryoborus* in New World Pachymerinae. These calcaria, however, sometimes fall off dried specimens. There are fewer carinae in Bruchinae and in slightly different positions, so a modified terminology was adopted by Nilsson and Johnson (1990). The seven carinae in the Pachymerinae are (the assumed homologous carinae in Bruchinae are in parenthesis): 1) inner ventral carina (ventral carina); 2) middle ventral carina; 3) outer ventral carina (lateroventral carina); 4) lateral carina (lateral carina); 5) dorsolateral carina; 6) mesal carina; 7) dorsomesal carina (dorsomesal carina) (Figs. 24, 35, 36). The definitions in Torre-Bueno (1989) for lateral and mesal cannot be used and the terms are redefined (see MORPHOLOGICAL TERMINOLOGY). *Mesosternal process.* The process appears in more or less three different forms and is an important character to separate species in some genera. Most often the apex of the process is either (i) slanting (Fig. 42) or (ii) feebly or sharply curved back towards the plane of the metasternum (Fig. 41); but sometimes (iii) the apex is produced, not slanting or curved back towards the plane of the metasternum, but projecting at a 90° angle from the body plane (when this is the case the spinasternum is often enlarged, produced and the anterior end of the metasternum slightly swollen).

Abdomen. Only two characters were found to be useful, the size (length/width ratio) of the pygidium (Figs. 62-65) and the amount of the pygidium covered by the elytra. The pygidium cover is included in the description for some species as a percentage.

Genitalia. *Median lobe.* The male genitalia offer some of the most stable and useful characters for distinguishing genera and species in bruchid beetles. However, in the New World tribe Pachymerini, the characters of the median lobe are only useful for *Caryobruchus* and to a limited extent in *Caryoborus* and *Speciomerus*. *Caryobruchus* is the only genus in Pachymerini with both basal and median sclerites. The median lobe displays little intraspecific variation and is valuable for the recognition of closely related species. The terminology used for the median lobe (Figs. 97, 98, 99, 101, 102) is that of Kingsolver (1970). New terminology is gemma (pl. gemmae) (see MORPHOLOGICAL TERMINOLOGY below). *Tegmen.* The lateral lobes are also of some limited use as characters, and the terminology follows that of Kingsolver (1970) and Nilsson and Johnson (1992) or is new (see MORPHOLOGICAL TERMINOLOGY below). *Female genitalia.* The sclerites and the length of the apodeme of the spiculum gastrale (Figs. 110, 111, 112) are useful characters in *Caryobruchus* and also to a limited extent in *Speciomerus*.

Host plants. Because many bruchids are host specific, this is often used as a taxonomic character (Johnson and Kingsolver 1973, 1976; Johnson 1990). But the present status of the New World palm taxonomy is such that a comparison can at best only be performed on palm genera. Many collections of palm seeds are needed since most museum specimens are without host records. Most often the host is only identified as "palm". However, the recent revision of *Sabal* (Zona, 1990) makes it possible to use host records for comparison with the genus *Caryobruchus*, the palm bruchids using the fruits of *Sabal* palms for egg laying. The host records for each species in the present study are from collection labels and the plant names were not investigated.

MORPHOLOGICAL TERMINOLOGY

Monros (1959) worked with the Chrysomelidae and made detailed, labeled drawings of beetles in the subfamily Sagrinae. This group of beetles is believed to be very closely related to the Bruchidae (Monros 1959; Kingsolver, pers. comm.). To our knowledge labeled drawings have never been published on bruchid body parts, even though such drawings could be useful since bruchids are morphologically very different from most other families of beetles. For this reason attempts have been made to illustrate all body parts discussed in this work.

The parts of the head discussed below are defined somewhat differently than other authorities. The gula only exists in the prognathous head type, and it is defined the following way by different authors: sclerite on the ventral side of the head between the labium and the foramen magnum (Borror *et. al.* 1989). Torre-Bueno gives several definitions: in prognathous insects, the fused lower ends of the postocciput forming a ventral plate; the throat; that sclerite forming the central portion of the head beneath, extending from the submentum to the posterior margin, and laterally bounded by the genae (Torre-Bueno 1989).

None of the definitions are very precise. Imms (1964) did not have a glossary, but explained many terms in the general text. He stated that in the prognathous head type the foramen magnum is inclined, or it retains the vertical position by elongation of the ventral part of the head. In Coleoptera he stated that this is done as a median ventral sclerite, the gula, extending from the occipital foramen to the base of the submentum, occupying an area between the postoccipital sutures. These sutures have extended forward on the head capsule, as have the posterior tentorial pits, and where they bound the gula they are called gular sutures.

Torre-Bueno's definition of head capsule included the gula, but this is incorrect because a head capsule exists in all types of insects, not only prognathous insects, while the gula only exists in prognathous insects. The gula has not been used very often in bruchid taxonomy, but Bridwell (1929) and Prevett (1966b) used "gula" as one of several characters to delimit species of *Pachymerus*. The "gula" they used is actually the submentum. The gula as defined here (gu, Figs. 46, 56) is the area between the gular sutures and the posterior tentorial pits (ptp, Fig. 56). These sutures are the ventral extensions of the postoccipital suture (Imms 1964; Torre-Bueno 1989) and mark the division between the gena and the gula. Sometimes the sutures are fused on the ventral side to only one suture, and in such a case (e.g. Curculionidae) the gula is considered absent (Borror *et. al.* 1989). The gular sutures are usually very easy to find because the gula is usually glabrous and not hidden under setae or sculptured integument. Furthermore, the posterior tentorial pits are associated with the gular sutures, which makes the sutures even easier to observe because they are slightly enlarged at the pit location. Since the head is articulate, part of the sutures and the pits are sometimes covered by the ventral side of thorax.

The gula is redefined the following way: **gula** (Fig. 56), the postoccipital area on the ventral side of the head, delimited by the genae (and the gular sutures), the submentum and the foramen magnum (occipital foramen). The gula exists in opisthognathous insects only.

The definitions of the vertex and occiput as given by Torre-Bueno (1989) are followed. The frons is redefined, and the parts illustrated and labeled to avoid misunderstandings: **frons** (Fig. 51), the upper anterior portion of the head capsule, close to the antennae, between the clypeus and the vertex; **vertex** (Figs. 51, 55), the top of the head between the eyes, frons and occiput, anterior to the occipital suture; **occiput** (Figs. 51, 55), dorsal part of the head between the occipital sulcus and the postoccipital sulcus.

The metatibia of the Pachymerinae has several carinae which are good taxonomic characters. As defined in Torre-Bueno (1989), mesal (adj.) cannot be used to name a carina on the metafemur because a mesal carina must be situated on or near the meson, and lateral (adj.) may be used for a carina on both the outer and the inner side of the metatibia: mesal, pertaining to, situated on, or in the meson; meson, midline of the body; mesad, toward or in the direction of the meson of the insect body; lateral, relating, pertaining or attached to the side; laterad, toward the side and away from the median line. Laterad and mesad are adverbs and cannot be used.

Since these terms have been used in bruchid literature a change in terminology would be confusing. We are redefining lateral and mesal for use here: **lateral**, relating, pertaining or attached to the side away from the meson of the insect body; **mesal**, relating, pertaining or attached to the side toward the meson of the insect body.

Some terminology of the male genitalia is new: **caput** (Fig. 100), the headlike area apical to the cingulum of the lateral lobes including Kingsolver's band and cutis; **cingulum** (Figs. 99,100, 115,116), the light colored girdle-like band on the basal side of Kingsolver's band (dark) of the lateral lobes; **cutis** (Figs. 99, 100), the apical area of the lateral lobes located on both sides of nodus usually with setae; **gemma** (pl. gemmae) the swollen structure consisting of two equal semi-elliptical, budlike parts of the male genitalia attached to both the median lobe and the lateral lobes (Figs. 105, 106, 114); **nodus** (Figs.99, 100), the emargination on the apex of the lateral lobes, sometimes cleft (Figs. 115, 116), sometimes only a sinuated line indicating separation of the lobes (Figs. 99, 100).

TAXONOMY OF THE PACHYMERINAE

Tribe CARYEDINI Bridwell

Caryedini Bridwell 1929:143.
Caryedontini (sic) Decelle 1966:172; Udayagiri and Wadhi 1989:226.

Native to the Old World. Body elongate or oval, usually small (2-8 mm). Head short, often concealed from above, eye facets of medium size, extending to both dorsal and ventral sides of head, postocular lobe short, ocular sinus vague. Pronotum subrectangular, transverse, disk not lobed on basal margin, lateral carina variable, in some genera extending from base to apex, in some not; if incomplete usually strong at posterior end, tapering, obsolete at anterior end. Scutellum not minute. Elytron elongate, usually covering only the base of pygidium, striate, striae punctate. Metafemur incrassate, ventral ridge usually pectinate. Metatibia carinate. Median lobe and lateral lobes highly variable.

KEY TO SUBFAMILIES OF BRUCHIDAE

1 Body always metallic; metatrochanter very large (Fig. 31); scutellum triangular (Fig. 50A) ...... **Rhaebinae**
— Body usually non-metallic; metatrochanter small; scutellum variable (Figs. 50 B-L) 2
2 (1) Metatibia without a mucro but with two long, sharp movable apical calcaria (Fig. 32); metacoxa twice as wide as metafemur (Fig. 32); metafemur usually without spines (Fig. 32) .... **Amblycerinae**
— Metatibia with mucro and fixed spines (Figs. 25-30) or without spines (*Caryoborus* (Pachymerinae) has two small apical calcaria much smaller than in Amblycerinae and ventrad to the mucro (Figs. 68-70)); metacoxa variable but not twice as wide as metafemur; metafemur with or without spines or denticles 3
3 (2) Antennae never longer than body length, metacoxa about as wide as metafemur and metafemur often with one or more spines .... **Bruchinae**
— If antennae shorter than body length, then metacoxa not as wide (or at most about as wide) as metafemur and metafemur with or without a pecten or spines; if antennae longer than body length, then metacoxa wider than metafemur and metafemur without a pecten or spines 4
4 (3) Metafemur with pecten and often also with spines (Fig. 23, 24); disk of pronotum with a surrounding (or almost so) impressed marginal line (Figs. 43 and 12) .... **Pachymerinae**
— Metafemur without pecten, with or without spines; disk of pronotum without a surrounding impressed marginal line 5
5 (4) Metafemur with small spines (Fig. 29); metacoxa much shorter than metafemur; base of pygidium covered by elytra; scutellum triangular .... **Eubaptinae**
— Metafemur without spines (Fig. 30); metacoxa about the same length as metafemur; pygidium and one or two tergites not covered by elytra; scutellum elongate .... **Kytorhininae**

KEY TO TRIBES OF PACHYMERINAE

1 Deep (long) ocular sinus (Figs. 20, 22); eyes not coarsely facetted; postocular lobe long (Figs. 20, 22): vestiture variegated .... **Caryopemini**
— Ocular sinus vague (Figs. 10-16, 19); eyes coarsely facetted; postocular lobe short (Fig. 19); vestiture of uniform color 2
2 (1) Prosternal process narrow if completely separating procoxae (Fig. 49), or acute if not completely separating procoxae (Fig. 48); protarsal and metatarsal segment 1 only feebly expanded triangularly at apex; body length usually 4 - 7 mm .... **Caryedini**
— Prosternal process wide or narrow and always completely separating procoxae, never acute (Figs. 46-47); protarsal and metatarsal segment 1 strongly expanded triangularly at apex; body length usually 8 - 20 mm .... **Pachymerini**

KEY TO GENERA OF TRIBE CARYEDINI

1 When hind leg flexed, tibia positioned on mesal side of pecten; pectenal denticle 1 on metafemur not large and acuminate (Fig. 38); two apical tubercles on apical side of pecten (Fig. 38); tibia with tubercle close to base (Fig. 38) . . . . *Exoctenophorus* Decelle

— When hind leg flexed, tibia positioned on lateral side of pecten (Fig. 36); pectenal denticle on metafemur large and acuminate (Fig. 36); no apical tubercles; tibia without tubercle near base (Fig. 36) 2

2 (1) Prosternum completely separating procoxae (Fig. 49); apex of prosternal process narrow but not acute (Fig. 49); elytral stria 1 (stria closest to the meson) bending away from the meson posterior to the apex of the scutellum (Fig. 50C) (stria continuing past apex of scutellum near the basal margin of the elytron); stria 2 and 9, and stria 3 and 8 usually joining at the apex of elytron; lateral carina of pronotum complete 3

— Prosternum not completely separating procoxae (Fig. 48); apex of prosternal process acute (Fig. 48); elytral stria 1 not bending away from the meson posterior to the apex of the scutellum (Fig. 50B) (stria only continuing to slightly posterior to scutellum apex); stria 2 and 9, and stria 3 and 8 not joining at the apex of elytron (often hard to see under setae); lateral carina of pronotum complete or incomplete 4

3 (2) Body rounded (Fig. 19); length of abdominal sternum 1 about 1.5 times the combined length of sterna 2 - 5; females with a glabrous field ("miroir", Decelle 1965) between elytral stria 9 and 10 close to humerus (Fig. 19) . . . . *Afroredon* Decelle

— Body elongate (Fig. 17); length of abdominal sternum 1 about the same as the combined length of sterna 2 - 5; females without a glabrous field between elytral stria 9 and 10 close to humerus . . . . *Mimocaryedon* Decelle

4 (2) Lateral carina of pronotum incomplete (Fig. 44), strong at posterior end, tapering, obsolete at anterior end; body oval (Fig. 16) . . . . *Caryedon* Schönherr

— Lateral carina of pronotum complete, extending from head to elytron; body elongate (Fig. 18) . . . . *Caryotrypes* Decelle

Genus **CARYEDON** Schönherr

Figs. 16, 40, 117, 189

Caryedon Schönherr 1823:1134.
Pachymerus Pic 1913:6.

Type species: *Bruchus serratus* Olivier 1790. Original designation.

Elongated or oval beetles. Integument usually medium to dark brown, usually with irregular, darker, almost black markings, setae often dense, uniformly brownish white or pale brown. Head short, constricted behind eye; vertex usually with sharp median carina, glabrous or partly covered by setae; eye large, bulging, extending to both dorsal and ventral sides of head; ocular sinus almost nonexistent; submentum tapering, posterior part medium width, sides parallel. Antennal segments 5-10 serrate. Pronotum subrectangular, transverse, base slightly wider than apex; disk with surrounding impressed marginal line, line sometimes weak or obsolete along anterior margin; lateral carina incomplete, not extending from head to elytron, strong at posterior end, tapering, obsolete at anterior end. Prosternum with short process, not completely separating procoxae. Mesosternum with long process, not cleft. Elytron elongate, approximately three times longer than wide, females without a glabrous field between elytral stria 9 and 10 near humerus. Scutellum square, not truncate apically. Metafemur incrassate, elongate; dorsal side nongranulate; ventral side pectinate; pecten with denticles, denticle 1 usually acuminate, usually slightly larger than the other denticles, located after middle of femur; when leg flexed, tibia positioned on lateral side of pecten; prepectenal ridge long, with spines, without protuberance. Metatibia arcuate; three strong ventral carinae, middle carina without tubercle and without sulcus; with lateral but without dorsolateral carinae; with mesal but without dorsomesal carinae; mucro at apex, without apical calcaria. Median lobe broad with basal hood broad, with both dorsal and ventral valve (dorsal valve absent in all other Pachymerinae genera), with median and basal sclerites. Lateral lobes confluent, not separated, without gemmae, with small cleft; Kingsolver's band absent, in some specimens present as faint, vague, undefined band.

Genus **CARYOTRYPES** Decelle

Fig. 18

Caryotrypes Decelle 1968:419.

Type species: *Pachymerus pandani* Blanchard 1845. Designation by monotypy.

Decelle (1968) incorrectly used the name *Caryotrypes pandani* (Blanchard) as the name of the type species.

This genus has not been studied. This description is translated and paraphrased from Decelle 1968. Elongated beetles. Antennal segments slender, segments 5-10 feebly serrate. Pronotum subrectangular, apical end wider than basal end, disk with surrounding impressed marginal line; lateral carina complete. Prosternum with short process, not completely separating procoxae. Elytron very elongate; without a glabrous field between elytral striae 9 and 10 near humerus; stria 1 originating posterior to apex of scutellum; striae 2 and 9, and striae 3 and 8 not united at apex, but at basal end striae 2 and 4 bend away from meson and striae 3 and 5 bend towards meson (so that striae 2 and 3 respectively striae 4 and 5 almost meet at the base). Process on metasternum narrow, acute. Metafemur pectinate on ventral side; when leg flexed, tibia positioned on lateral side of pecten. Metatibia with carinae, without tubercle. Genitalia unknown (not dissected).

Genus **MIMOCARYEDON** Decelle

Figs. 17

Mimocaryedon Decelle 1968:419.

Type species: *Mimocaryedon freyi* Decelle 1968. Original designation.

This genus has not been studied. Described by Decelle (1968) from one individual female (male unknown), found in the private collection of D. Frey (for whom the type species of this monotypic genus was named). Unfortunately, Decelle returned the specimen to D. Frey, instead of safely depositing it in a museum. D. Frey is now dead and his descendants are disputing the inheritance, including the insect collection, and the future of the collection is uncertain (Decelle, pers. comm.). This description is translated and paraphrased from Decelle 1968. Oval beetles. Antennal segments 4-10 serrate. Pronotum subrectangular, base wider than apex; lateral carina complete. Prosternum with long process, completely separating procoxae. Elytron elongate; without a glabrous field between elytral striae 9 and 10 close to humerus; stria 1 originating anterior to apex of scutellum, bending in a direction away from the meson; striae 2 and 9, and striae 3 and 8 united at apex. Process on metasternum wide, rounded. Metafemur pectinate on ventral side; pecten with denticles, denticle 1 slightly larger than the other denticles, located beyond middle (posterior 2/5th) of femur; when leg flexed, tibia positioned on lateral side of pecten. Metatibia with carinae, without tubercle. Genitalia unknown (dissected, but only spermatheca described and illustrated by Decelle 1968).

Genus **AFROREDON** Decelle

Figs. 19, 36, 185

Afroredon Decelle 1965:213.

Type species: *Afroredon africanus* Decelle 1965. Original designation.

Small, short, oval beetles. Integument usually light to medium brown, setae often dense uniformly white. Head short, constricted behind eye; vertex with sharp median, glabrous, carina; eye large, bulging, extending to both dorsal and ventral sides of head; ocular sinus vague; submentum tapering, posterior part of medium width, sides parallel. Antennal segments 5-10 serrate. Pronotum subrectangular, transverse, base about the same width as apex; disk with surrounding impressed marginal line; lateral carina complete, extending from base to apex. Prosternum with short process, not completely separating procoxae. Mesosternum with long process, not cleft. Elytron oval, approximately two times longer than wide, females with a glabrous field between elytral striae 9 and 10 near humerus. Scutellum quadrate, not truncate apically. Metafemur incrassate, oval; dorsal side nongranulate; ventral side pectinate; pecten with denticles, denticle 1 usually acuminate, usually slightly larger than the other denticles, located after middle of femur; when leg flexed, tibia positioned on lateral side of pecten; prepectenal ridge long, with spines, without protuberance. Metatibia arcuate; three strong ventral carinae, middle carina without a tubercle or sulcus; with lateral but without dorsolateral carinae; with mesal but without dorsomesal carinae; mucro at apex, without apical calcaria. Median lobe slender, basal hood slender, without dorsal valve, with ventral valve, without sclerites. Lateral lobes confluent, not separated, without gemmae, with small cleft; Kingsolver's band present.

Genus **EXOCTENOPHORUS** Decelle

Figs. 21, 38, 186-188

Exoctenophorus Decelle 1968:414.

Type species: *Exoctenophorus deflexicollis* Decelle 1968. Designation by monotypy.

Short, oval beetles, almost as wide as long. Integument light brown, setae sparse, uniformly whitish, area between the stria with pubescence of alternating fine and medium textured setae giving an effect of alternating color, making the elytron appear striped. Head short, constricted behind eye; vertex with diffuse median carina, sometimes partly covered by setae; eye large, feebly bulging, extending to both dorsal and ventral sides of head; ocular sinus vague; submentum tapering, posterior part wide, subtriangular, converging posteriorly between eye and gena. Antennal segments 4-10 serrate, sometimes 3rd segment feebly serrate. Pronotum subrectangular to almost subpentagonal, transverse, base and apex about the same width; disk with surrounding impressed marginal line; lateral carina complete, extending from base to apex. Prosternum with short, acute process, only separating procoxae to about 25% their length. Mesosternum with long, medium width process, not cleft. Elytron oval, approximately two times longer than wide. Scutellum trapezoid, wider basally. Metafemur incrassate, oval; dorsal side nongranulate; ventral side pectinate; pecten with denticles, denticle 1 acuminate, larger than the other denticles, located before middle of femur; when leg flexed, tibia positioned on mesal side of pecten; prepectenal ridge short, without spines, without a protuberance. Metatibia arcuate; three strong ventral carinae, middle carina with a tubercle, without sulcus; with lateral and mesal carinae; dorsolateral and dorsomesal carinae obsolete; mucro at apex, with apical calcaria. Median lobe very slender, without median sclerites, with one complex basal sclerite. Lateral lobes confluent, not separated, very slender, with small cleft; Kingsolver's band present.

Tribe CARYOPEMINI Bridwell

Caryopemini Bridwell 1929:143; Udayagiri and Wadhi 1989:236.
Caryopemontini (sic) Decelle 1968:413.

Native to the Old World. Body elongate or oval, size 4-15 mm. Head elongate, often concealed from above, eye finely facetted, barely extending to ventral side of head, postocular lobe long, ocular sinus prominent. Pronotum subconical, wider at base, disk lobed on basal margin, lateral carina complete or incomplete. Scutellum variable. Elytron elongate, usually covering more than the base of pygidium, striate, striae punctate. Metafemur incrassate, ventral ridge usually pectinate. Metatibia carinate. Male genitalia without sclerites or with median and basal sclerites. Lateral lobes without Kingsolver's band.

KEY TO GENERA OF TRIBE CARYOPEMINI

1 Metafemur elongated (Fig. 39); scutellum minute (Fig. 50E); dorsal side of metafemur granulate (Fig. 20); prosternal process acute and separating procoxae for about 90% of their length .... ***Caryopemon*** Jekel

– Metafemur oval (Fig. 37); scutellum not minute (Fig. 50D); dorsal side of metafemur not granulate; prosternal process acute and separating procoxa for about 60% of their length.... ***Diegobruchus*** Pic

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Genus **CARYOPEMON** Jekel

Figs. 20, 39, 50, 190, 191

Caryopemon Jekel 1855:25.
Protocaryopemon Borowiec 1987:53; Nilsson and Johnson 1991:349.

Type species: *Caryopemon hieroglyphicus* Jekel 1855. Designated by monotypy.

Elongated, oval beetles. Integument usually dark brown, setae dense, variegated, white, beige to light brown, in variable patterns. Head long, not constricted behind eye; vertex with sharp or diffuse median carina, sometimes covered by setae; eye large, feebly bulging, barely extending to ventral side of head; ocular sinus prominent; submentum not tapering, posterior part wide, subrectangular, not converging between eye and gena. Antennal segment 4 serrate, segments 5-10 pectinate. Pronotum subpentagonal, conical, wider at base; disk with surrounding impressed marginal line which is weak or sometimes obsolete along anterior margin; lateral carina complete, extending from base to apex (sometimes weak and often covered by setae at apex). Prosternum with long narrow process, separating procoxae for about 90% of their length. Mesosternum with long wide process extended to metasternum, not cleft. Metasternum sometimes angular in profile. Elytron elongate, approximately 2.5 times longer than wide. Scutellum elongate, minute. Metafemur incrassate, elongate; dorsal side granulate; ventral side pectinate; pecten with denticles, denticle 1 not acuminate, same size or smaller than other denticles, located beyond middle of femur; when leg flexed tibia positioned on mesal side of pecten; prepectenal ridge with spines and without protuberance. Metatibia arcuate; three strong ventral carinae, middle carina without tubercle and sulcus; with lateral and dorsolateral carinae; with mesal and dorsomesal carinae; mucro at apex, without apical calcaria. Median lobe slender, with spines, without sclerites. Lateral lobes confluent, not separated, wide, with small cleft and large groove surrounding the median lobe at all sides except ventral side; Kingsolver's band absent.

Genus **DIEGOBRUCHUS** Pic

Figs. 22, 37, 50, 192

Diegobruchus Pic 1913:110.

Type species: *Bruchus suarezicus* Pic. Designated by monotypy.

Short, oval beetles, almost as wide as long. Integument usually light brown to black, setae dense to sparse, variegated, with scattered spots of white, beige to light brown and yellow. Head long, not constricted behind eye; vertex with diffuse median carina, often partly covered by setae; eye medium size, feebly bulging, not extending to ventral side of head, or only feebly so; ocular sinus prominent; submentum tapering, posterior part wide, subtriangular, converging between eye and gena. Antennal segments variable, segments 3 and 4 usually serrate sometimes pectinate (segment 3 sometimes only feebly so), segments 5-10 serrated or pectinate. Pronotum subpentagonal, transverse, convex, wider at base; lateral sides of disk without impressed marginal line, basal and apical margin with an impressed marginal line, partly covered by setae; lateral carina incomplete, very short, not extending from base to apex. Prosternum with short acute process separating procoxae for about 60% of their length. Mesosternum with long wide process, not cleft. Elytron oval, approximately 1.8 times longer than wide. Scutellum elongate, quadrate, not minute. Metafemur incrassate, oval; dorsal side nongranulate; ventral side pectinate; pecten with denticles, denticle 1 acuminate, usually larger than other denticles, located beyond middle of femur; when leg flexed, tibia positioned on mesal side of pecten; prepectenal ridge long, with spines, without a protuberance. Metatibia arcuate; three strong ventral carinae, middle carina without tubercle and sulcus; with lateral and dorsolateral carinae; with mesal and dorsomesal carinae; mucro at apex, without apical calcaria. Median lobe semi-broad, with median and basal sclerites. Lateral lobes confluent, not separated, with small cleft; Kingsolver's band absent.

Tribe PACHYMERINI Bridwell

Pachymerini Bridwell 1929:143; Decelle 1965:214; Udayagiri and Wadhi 1989:234.

Native to the New World. Body elongate, usually large, 5-21 mm. Head short, prolonged into a short rostrum, often concealed from above, eye coarsely faceted, extending to both dorsal and ventral sides of head, postocular lobe short, ocular sinus almost nonexistent. Pronotum sub-rectangular, transverse, disk not lobed on basal margin, lateral carina complete, extending from head to elytron. Scutellum not minute. Elytron elongate, usually covering only base of pygidium, striate, stria punctate. Metafemur incrassate, ventral ridge usually pectinate. Metatibia carinate. Median lobe without sclerites or with only basal sclerites (*Caryobruchus* has both median and basal sclerites, variable in *Caryoborus*), lateral lobes with Kingsolver's band.

KEY TO GENERA OF TRIBE PACHYMERINI

1 When leg flexed, tibia positioned on mesal side of pecten (Figs. 23B, D); metafemur with a long (clearly longer than 1/2 length of metafemur) pecten usually not produced (Figs. 24B, C); metatibia with six or seven carinae, with a tubercle near the base; median lobe without sclerites (Figs. 163, 167); lateral lobes usually with gemmae (Figs. 102, 106, 161) (except *P. cardo*, Fig. 157) .... ***Pachymerus*** Thunberg

— When leg flexed, tibia positioned on lateral side of pecten (Figs. 23A, C); metafemur short (about 1/2 length of metafemur or shorter) or of medium length, usually with pecten produced (Fig. 24A); metatibia with three carinae, without a tubercle near the base; median lobe usually with sclerites (Figs. 120, 122, 128, 131, 140); lateral lobes without gemmae 2

2 (1) Metatibia with two small apical calcaria ventrad to mucro (Figs. 68-70); pecten of medium length with denticle 1 located slightly before middle of femur; prepectenal ridge shorter than pecten without spines but with a protuberance (Figs. 68-70) positioned on the lateral side of metatibia when leg flexed (protuberance not cristate, sometimes weak); median lobe with small, often very weak, median sclerites (Figs. 118, 120, 122) .... ***Caryoborus*** Schönherr

— Metatibia without apical calcaria; pecten short with denticle 1 located beyond middle of femur (except *Caryobruchus marieae* with denticle 1 located near middle of femur); prepectenal ridge longer than pecten with spines (Figs. 71-75, 77-80), and with or without protuberance (protuberance cristate); median lobe with median sclerites (Figs. 128, 131, 134, 137, 140, 143, 146, 149, 152, 155) (except *Speciomerus rubrofemoralis*, Fig. 134) 3

3 (2) Sides of submentum strongly converging triangularly between eyes (distance between eyes on ventral side usually distant) (Fig. 58); genae long; median lobe always with both basal and median sclerites (Figs. 140, 143, 146, 149, 152, 155) .... ***Caryobruchus*** Bridwell

— Sides of submentum parallel or almost so (distance between eyes on ventral side usually approximate) (Fig. 61); genae short; median lobe never with median sclerites (Figs. 128, 131, 134, 137) ..... ***Speciomerus*** Nilsson

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Genus **CARYOBORUS** Schönherr

Caryoborus Schönherr 1833:92.
Pachymerus: Pic 1913:6.

Type species: *Bruchus serripes* Sturm 1826. Original designation.

Elongated beetles. Integument usually dark brown to almost black, setae sparse, uniformly whitish. Head short, constricted behind eye; vertex with sharp or diffuse median carina, sometimes covered by setae; eye large, bulging, extending to both dorsal and ventral sides of head; ocular sinus short but distinct; submentum tapering, posterior part wide, sides almost parallel, only feebly converging between eye and gena. Antennal segments 4-10 serrate, in many males and sometimes females of *Caryoborus serripes* the 3rd segment also feebly serrate. Pronotum subrectangular, transverse, base and apex about the same width; disk with surrounding impressed marginal line; lateral carina complete, extending from base to apex. Prosternum with long process, completely separating procoxae. Mesosternum with long process, cleft or not cleft. Elytron elongate, approximately 3 times longer than wide. Scutellum square, truncate apically. Metafemur incrassate, elongate; dorsal side smooth; ventral side pectinate; pecten produced, curved, with denticles, denticle 1 acuminate, longer than other denticles, located before middle of femur; when leg flexed, tibia positioned on lateral side of pecten; prepectenal ridge shorter than pecten, without spines, when leg flexed, with protuberance positioned on the lateral side of metatibia. Metatibia arcuate; three strong ventral carinae, middle carina without tubercle and sulcus; lateral and dorsolateral carinae obsolete; mesal and dorsomesal carinae obsolete; mucro at apex, with apical calcaria. Median lobe slender, with median sclerites (sometimes very vague), with or without basal sclerites. Lateral lobes confluent, not separated, but with narrow, rather long cleft; without gemmae; Kingsolver's band present.

The following three species of *Caryoborus* are considered valid: *C. chiriquensis* Sharp, *C. gracilis* Nilsson, new species, and *C. serripes* (Sturm).

KEY TO SPECIES OF **CARYOBORUS**

1. Antennae longer than elytron; antennal segments long (Fig. 95 C); pecten with 15-24 denticles (Fig. 70); apex of mesosternal process usually sharply curved back towards plane of metasternum (Fig. 41) .... *C. serripes* (Sturm)

- Antennae shorter than elytron; antennal segments short (Fig. 95 A, B); pecten with 16 denticles or less; apex of mesosternal process usually slanting, not sharply curved back towards plane of metasternum (Fig. 42) 2

2 (1) Male genitalia with apical triangle as in Figs. 120 & 121; antennal segments slender (Fig. 95 B); pecten with 13-16 denticles; prosternal disk usually sparsely punctulate .... ***C. gracilis*** Nilsson

- Male genitalia with apical triangle not as in Fig.120 & 121; antennal segments wide (Fig. 95 A); pecten with 7-14 denticles; prosternal disk usually moderately punctulate .... ***C. chiriquensis*** Sharp

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Caryoborus chiriquensis Sharp

Figs. 1, 42, 69, 95, 118, 119, 124

Caryoborus chiriquensis Sharp 1885:504; Bridwell 1929:147.
Pachymerus chiriquensis: Pic 1913:7.
Caryobruchus chiriquensis: Udayagiri and Wadhi 1989:239.

Type Data.—Type locality: V. de Chiriqui, Panama. Holotype and one paratype deposited in The Natural History Museum, London (BMNH). Sharp (1885) mentioned four specimens in his original description, but the location of the other two is unknown. The holotype designation is uncertain; the Natural History Museum regards one of the specimens labelled "type" as the holotype, the others as paratypes (pers. comm. S.L. Shute, The Natural History Museum, London). Sharp's choice of words indicates clearly that he did not know that *B. serripes* Sturm was congeneric. The original description and Bridwell's treatment of *C. chiriquensis* and *B. serripes* is such that there is no question about the identity of *C. chiriquensis*.

Distribution .—(Fig. 1). Specimens examined, 58. Colombia, Ecuador (Carchi, Cotopaxi, Pinchincha).

Diagnosis.—Integument medium brown to dark brown, sometimes almost black; fine, white to yellowish-white pubescence partially cover integument color. Males 8.0-9.5 mm, females 7.5-9.7 mm in total length (pronotum-elytra); width of males 3.5-4.0 mm, females 3.8-6.0 mm, maximum thoracic depth of males 2.2-3.5 mm, females 2.3-4.2 mm. Eyes approximate. Antennal segments 4-10 serrate, in males segment 3 usually not feebly serrate, segments longer than wide, segment 4 not as wide as segment 9, segments 9-11 only slightly longer than wide. Pronotum disk wider than long (length/width ratio mean 0.79). Metafemur about twice as long as wide (length/width ratio mean 1.95); pecten with 7-14 rather large denticles. Pygidium slightly longer than wide (length/width ratio mean 1.16).

Males.—Integument. Hirsute, base of each seta in a minute puncture (therefore minutely punctulate where setae have been removed). Gula, ventral part of gena, apical end of proepimeron (with golden setae lining the margin), metacoxa near trochanter glabrous. *Color.* Body and appendages uniform medium brown to dark brown, sometimes almost black.

Vestiture. Dorsal and ventral body surfaces with white to yellowish-white, fine, short, recumbent, regular, setae; antenna with minute white setae; surface of elytron moderately hirsute; protibia and mesotibia with coarse, golden, moderately dense to dense setae apically; metatibia lacking golden setae except a few golden setae inside apex of mucro; ventral ridge of metafemur with sparse setae not covering pecten, in between each denticle a large, light golden seta; tarsomere 1 with moderately dense golden setae, ventral side of tarsomere 2 with a few coarse, golden setae, ventral side of tarsomere 3 with many very dense, coarse, golden setae; pygidium not as densely hirsute as elytron, setae longer.

Head. Shorter than pronotum; frons and vertex with usually hirsute carina, carina at vertex not interrupted by a weak depression; ocular sinus short, but distinct; on dorsal side eyes approximate; postocular lobe short; antenna shorter than elytron, segments 4-10 strongly serrate, longer than wide, segment 4 not as wide as segment 9, segment 9-11 only slightly longer than wide; gena medium length; sides of submentum almost parallel, only feebly converging triangularly between eyes; on ventral side eyes distant.

Prothorax. Disk wider than long (length/width ratio mean 0.79); moderately to densely punctate, large punctations more or less evenly distributed;

all sides with strong, impressed, marginal line, anterior margin usually feebly emarginate; angles vaguely pointed, visible in dorsal view; dorsal surface medially flattened; sides depressed, more depressed toward apex, rounded, narrowed to apex from slightly more than middle of side; angles of lateral margin at base feebly produced, angle usually more than 90°; posterior margin arcuate, produced medially; strong lateral prothoracic carina complete, extending from head to elytron. Protarsus 1 shorter but only slightly wider than metatarsus 1 (only feebly wider than in females). Prosternum completely separating procoxae, apex of prosternal process narrow or mostly so.

Mesothorax and Metathorax. Scutellum small, subquadrate. Elytron with dorsal surface flattened between humerus and mesal margin, depressed laterally and apically; humerus non-scabrous (sometimes feebly scabrous); striae punctate. Metafemur incrassate, maximum width closer to base, constricted toward apex, slightly more than twice as long as wide (length/width ratio 1.95), ventral side with a pecten armed with 7-14 rather large denticles, produced, long, feebly curved; denticle 1 large, acuminate, closer to femoral base than to apex; following denticles smaller but only decreasing slightly in size; when leg flexed, tibia positioned on lateral side of pecten; prepectenal ridge shorter than pecten, without spines, with a weak protuberance positioned on lateral side of metatibia when leg flexed; lateral side with small punctures, often hidden under setae. Metatibia evenly arcuate (angle >90°); three strong ventral carinae; lateral, dorsolateral, mesal and dorsomesal carinae obsolete; mucro long; tibial corona with two calcaria originating in depression on dorsal side of mucro; spur not visible in lateral view. Mesotarsus 1 slightly shorter, but about as wide as metatarsus 1. Apex of mesosternal process without cleft, slanting, projecting with less than 90° angle from body plane, apex not sharply curved back toward plane of metasternum; metaspinasternum feebly produced.

Abdomen. Sternum 1 about as long as remaining sterna. Pygidium punctulate, convex in lateral view, slightly longer than wide (length/width ratio mean 1.16), wider at base than apex, partly hidden by elytra, elytra cover 0-50% length of pygidium from base, in less than 90° angle to elytron, visible in dorsal view.

Genitalia. Median lobe (Fig. 118) slender. Ventral valve long with sides forming a triangle with an acute angle. Armature of internal sac with small, very weak median sclerites, without basal sclerites. Lateral lobes (Fig. 119) appear as one, with very large (for the subfamily) cleft, extending to 0.5 length of distance from apex to Kingsolver's band; cutis partly surrounding apex of median lobe on dorsal and lateral sides.

Females.— Similar to males, but maximum thoracic depth slightly larger. Armature of bursa copulatrix and apodeme of spiculum gastrale (Fig. 124).

Specific Records.—Host records are from collection labels, spelled exactly as written, and should be verified. Colombia: quarantine Miami, in palm, 14.IV.1966, (USNM). Ecuador: Carchi, elev. 1250m, 1-10.VIII.1983, J.E. Rawlins (CMNH); Cotopaxi, Las Pampas, ex *Phytelephas*, XI.86, VII.87, I.88, G. Onore (PUC); Cotopaxi, San Francisco de las Pampas, alt. 1200m, ex *Phytelephas aequatorialis* Spruce, 1991, H. Borgtoft Pedersen (BP); Loja, (AMNH); Pinchincha, Santo Domingo D.L.C., X.1983, Onore (CDJ); Pinchincha, Tinalandia, 700m elevation, 26-28.V.1976, Alluriquin (FDA); unknown quarantine, Baraganata, in Ivory nuts, (USNM). Panama: Canal Zone, Cristóbal, pier 7, 25.X.1918, H.F. Dietz (USNM); V. de Chiriqui, Champion, *holotype*, (BMNH).

Discussion.—Bridwell (1929) stated that many palm nuts originated in Ecuador but were shipped through Panama. Only the holotype and one specimen labeled "Cristóbal, pier 7" were collected in Panama (probably shipped from Ecuador through the Panama Canal where it was intercepted). It is therefore questionable if the insect exists in Panama. It is possible that this species only exists in Ecuador and southern Colombia. Thus, Panama is not included in the distribution.

Caryoborus gracilis Nilsson, **new species**

Figs. 1, 68, 95, 120, 125

Type Data.—Type locality: Maturín, Monagas, Venezuela. Holotype, Venezuela, Monagas, Maturín, ex *Mauritia flexulosa* L. seeds, 5.II.1973, D.H. Janzen; deposited in U.S. National Museum of Natural History, Washington, D.C. (USNM). Allotype, Venezuela, Monagas, Maturín, ex *Mauritia flexulosa* L. seeds, 5.II.1973, D.H. Janzen; deposited in USNM. Paratypes, 37. Bolivia: (1) Pando, Prov. Manuripi, Alta Gracia, 22.X.1989, ex. semilla de *Jessenia*, I. Vargas (FMNH); (1) Santa Cruz, Prov. Andrés Ibañez, S.C. de la Sierra, 21.V.89,

P. Bettella (FMNH). Brazil: (1) Bahia, Chapada, Oct. (CMNH); (1) Rondonia, Ouro Preto do Oeste, 29.X.1987, L. Elias (UFDP); (1) Rio Branco, Uranduique, VII.1960, Pereira & Machado (USNM); (2) in palm seeds Brazil, Hoboken 3333 (USNM); (3) CNHM 1955, Karl Brancsik coll. ex Eduard Knirsch, (FMNH). Colombia: (3) Meta, Villavicencio aviport, ex *Dictyocaryum fuscum* H. Wendl., VIII.2.41, D. Fairchild (USNM). Ecuador: (1) Pinchincha, Tinalandia, 15km E Santo Domingo, 27.VIII.83, reared seed palm, C.D. Johnson (CDJ). French Guiana: (1) Lansberg (UZMC); (2) Piste de St. Elie Pt.15, ex *Jessenia bataua* Burret, 14 Novembre 1986, Plinio Sist Leg (ORST). Peru: (2) Loreto, Jennaro-Herrera, ex *Oenocarpus*, Oct.1990, G. Couturier (ORST); (11) Loreto, Jennaro-Herrera, ex *Jessenia bataua* Burret, 11-X-91, G. Couturier (ORST); (3) Junín, Satipo, XI.1944, Paprzycki (AMNH); Nov. 48, Paprzycki (USNM); (1) Madre de Dios, Mouth of Rio la Torre, S bank of Rio Tambopata, alt. ca 100m, 11.VIII.1979, LJB (RIL); (1) quarantine Miami, 4.X.1977, (USNM); (1) quarantine Washington, D.C., Lima, ex *Jessenia* sp., (X-11-46) (USNM). Venezuela: (1) Monagas, Maturín, ex *Mauritia flexulosa* L. seeds, 5.II.1973, D.H. Janzen (USNM).

Etymology.— Named, as a noun in apposition to *Caryoborus*, because of the smaller size and more slender forms, especially the antenna, when compared to *C. chiriquensis* and *C. serripes*.

Distribution.— (Fig. 1). Specimens examined, 39. Bolivia (Pando, Santa Cruz), Brazil (Bahia, Rondonia), Colombia (Meta), Ecuador (Pinchincha), French Guiana, Peru (Junín, Loreto, Madre de Dios), Venezuela (Monagas).

Diagnosis.— Integument light brown to dark brown; fine, white to yellowish-white pubescence partially cover integument color. Males 7.0-9.2 mm, females 6.9-9.7 mm in total length (pronotum-elytra); width of males 3.4-4.4 mm, females 3.3-4.5 mm, maximum thoracic depth of males 2.4-3.6 mm, females 2.1-4.1 mm. Eyes approximate. Antennal segments 4-10 feebly serrate, in males segment 3 not feebly serrate, segments longer than wide, segment 4 not as wide as segment 9, segment 9-11 clearly longer than wide. Disk of pronotum wider than long (length/width ratio mean 0.81). Metafemur about twice as long as wide (length/width ratio mean 2.07); pecten with 13-16 medium-sized denticles. Pygidium much longer than wide (length/width ratio mean 1.32).

Differential Diagnosis.—See COMPARISONS OF SPECIES IN CARYOBORUS.

Males.—Integument. Hirsute, base of each seta in a minute puncture (therefore minutely punctulate where setae have been removed). Gula, ventral part of gena, apical end of proepimeron (with golden setae lining the margin), metacoxa near trochanter glabrous. *Color.* Body and appendages uniform light brown to dark brown.

Vestiture. Dorsal and ventral body surfaces with white to yellowish-white, fine, short, recumbent, regular setae; antenna with minute white setae; surface of elytron moderately hirsute; protibia and mesotibia with coarse, golden, moderately dense to dense setae apically; metatibia lacking golden setae except a few golden setae inside apex of mucro; ventral ridge of metafemur with sparse setae, not covering pecten, in between each denticle a large, light golden seta; tarsomere 1 with moderately dense, golden setae, ventral side of tarsomere 2 with a few, coarse, golden setae, ventral side of tarsomere 3 with many, very dense, coarse, golden setae; pygidium not as densely hirsute as elytron, setae longer.

Head. Shorter than pronotum; frons and vertex with carina partly glabrous, carina at vertex not interrupted by a weak depression (Fig. 96); ocular sinus short, but distinct; on dorsal side eyes approximate; postocular lobe short; antenna shorter than elytron, segments 4-10 feebly serrate, longer than wide, segment 4 not as wide as segment 9, segment 9-11 clearly longer than wide; gena medium length; sides of submentum almost parallel, only feebly converging triangularly between eyes; on ventral side eyes distant.

Prothorax. Disk wider than long (length/width ratio mean 0.81); sparsely punctate, large punctations unevenly distributed as four clusters; all sides with strong, impressed, marginal line, anterior margin usually feebly emarginate; angles vaguely pointed, visible in dorsal view; dorsal surface convex medially; sides depressed, more depressed toward apex, rounded, narrowed to apex from slightly more than middle of side; angles of lateral margin at base feebly produced, angle usually more than 90°; posterior margin arcuate, produced medially; strong lateral prothoracic carina complete, extending from base to apex. Protarsus 1 shorter but slightly wider than metatarsus 1 (feebly wider than in females). Prosternum completely separating procoxae, apex of prosternal process narrow.

Mesothorax and Metathorax. Scutellum small, subquadrate. Elytron with dorsal surface flattened between humerus and mesal margin, depressed laterally and apically; humerus scabrous; striae punctate. Metafemur incrassate, maximum width closer to base, constricted toward apex, slightly more than twice as long as wide (length/width ratio 2.07), ventral side with a pecten armed with 13-16 medium-sized denticles, produced, long, feebly curved; denticle 1 large, acuminate, closer to femoral base than to apex; following denticles smaller but only decreasing slightly in size; when leg flexed, tibia positioned on lateral side of pecten; prepectenal ridge shorter than pecten, without spines, with a weak protuberance positioned on lateral side of metatibia when leg flexed; lateral side with small punctures, often hidden under setae. Metatibia evenly arcuate (angle >90°); 3 strong ventral carinae; lateral, dorsolateral, mesal and dorsomesal carinae obsolete; mucro long; tibial corona with 2 calcaria originating in the depression on dorsal side of mucro; spur not visible in lateral view. Mesotarsus 1 slightly shorter, slightly wider than metatarsus 1. Apex of mesosternal process with a cleft, slanting, projecting with less than 90° angle from body plane, at apex not sharply curved back towards plane of metasternum; metaspinasternum produced.

Abdomen. Sternum 1 about as long as remaining sterna. Pygidium punctulate, convex in lateral view, much longer than wide (length/width ratio mean 1.32), wider at base than apex, partly hidden by elytra, elytra cover 10-70% length of pygidium from base, in less than 90° angle to elytron, visible in dorsal view.

Genitalia. Median lobe (Fig. 120) slender. Ventral valve very long with sides forming a triangle with a extremely acute angle. Armature of internal sac with small, rather strong median sclerites; without basal sclerites. Lateral lobes (Fig. 121) appear as one, with very large (for the subfamily) cleft, extending to 0.6 length of distance apex to Kingsolver's band; cutis partly surrounding apex on dorsal and lateral sides of median lobe.

Females.— Similar to males, but maximum thoracic depth slightly larger. Armature of bursa copulatrix and apodeme of spiculum gastrale (Fig. 125).

Specific Records.— (See list of paratypes.) Host records are from collection labels, spelled exactly as written, and should be verified.

Caryoborus serripes (Sturm)

Figs. 1, 7, 10, 23, 41, 70, 95, 97, 115, 116, 122, 123, 126

Bruchus serripes Sturm 1826:74; Boheman 1829:117.
Bruchus (*Caryoborus*) *serripes*: Schönherr 1833:93.
Pachymerus serripes: Pic 1913:8.
Caryoborus serripes: Bridwell 1929:147; Udayagiri and Wadhi 1989:238.
Caryoborus priocerus Chevrolat 1877:99. **New synonymy.**

Type Data.—Type locality: Para, Brazil. Holotype; depository unknown, but the original description, and Bridwell's treatment of *B. serripes* and of *C. chiriquensis*, is such that there is no question about the identity of *C. serripes*. Old publications sometimes give Boheman credit for this species. Perhaps the type was lost, or no type had been designated when Boheman redescribed this species three years after Sturm's original description. No paratypes. *Caryoborus priocerus*. Holotype, Cayenna, D. Gehin, Col. Chevrol.; deposited in Naturhistoriska Riksmuseet, Stockholm (NR).

Distribution .—(Fig. 1). Specimens examined, 77. Bolivia (Beni), Brazil (Acre, Amazonas, Espirito Santo, Maranão, Rio de Janeiro, Pará), Ecuador (Napo), French Guiana, Guyana, Peru (Loreto), Suriname.

Diagnosis.—Integument medium brown to dark brown, sometimes almost black; fine, white pubescence partially cover integument color. Males 7.4-10.8 mm, females 6.3-12.9 mm in total length (pronotum-elytra); width of males 3.4-4.2 mm, females 3.8-6.2 mm, maximum thoracic depth of males 2.1-3.6 mm, females 2.3-4.5 mm. Eyes approximate. Antennal segments 4-10 strongly serrate, in males segment 3 often feebly serrate (rarely so in females), segments longer than wide, segment 4 wider than segment 9, segment 9-11 much longer than wide. Disk of pronotum wider than long (length/width ratio mean 0.81). Metafemur slightly more than twice as long as wide (length/width ratio mean 2.02); pecten with 15-24 rather small denticles. Pygidium slightly longer than wide (length/width ratio mean 1.11).

Males.—*Integument.* Hirsute, base of each seta in a minute puncture (therefore minutely punctulate where setae have been removed). Gula, ventral part of gena, apical end of proepimeron (with golden or yellow setae lining the margin), metacoxa near trochanter glabrous.. *Color.* Body and appendages uniform medium brown to dark brown, sometimes almost black.

Vestiture. Dorsal and ventral body surfaces with white, fine, short, recumbent, regular, setae; antenna with minute white setae; elytron surface moderately hirsute; protibia and mesotibia with coarse, golden, moderately dense to dense setae apically; metatibia lacking golden setae except a few golden setae inside apex of mucro; ventral ridge of metafemur with sparse setae not covering the pecten, in between each denticle a large, light golden seta; tarsomere 1 with moderately dense, golden setae, ventral side of tarsomere 2 with a few, coarse, golden setae, ventral side of tarsomere 3 with many very dense, coarse, golden setae; pygidium not as densely hirsute as elytron, setae longer.

Head. Shorter than pronotum; frons and vertex with slightly glabrous carina, carina at vertex interrupted by a weak depression (Fig. 96); ocular sinus short, but distinct; on dorsal side eyes approximate; postocular lobe short; antenna usually longer than elytron, segments 4-10 strongly serrated, longer than wide, segment 4 wider than segment 9, segment 9-11 much longer than wide; gena medium length; sides of submentum almost parallel, only feebly converging triangularly between eyes; on ventral side eyes distant.

Prothorax. Disk wider than long (length/width ratio mean 0.81); moderately to densely punctate, large punctations evenly distributed; all sides with strong, impressed, marginal line, anterior margin usually feebly emarginate; angles vaguely pointed, visible in dorsal view; dorsal surface medially flattened; sides depressed, more depressed toward apex, rounded, narrowed to apex from slightly more than middle of side; angles of lateral margin at base feebly produced, angle more than 90°; posterior margin arcuate, produced medially; strong lateral prothoracic carina complete, extending from base to apex. Protarsus 1 shorter but only slightly wider than metatarsus 1. Prosternum completely separating procoxae, apex of prosternal process medium width.

Mesothorax and Metathorax. Scutellum small, subquadrate. Elytron with dorsal surface flattened between humerus and mesal margin, depressed laterally and apically; humerus scabrous (rarely non-scabrous); striae punctate. Metafemur incrassate, maximum width closer to base, constricted toward apex, slightly more than twice as long as wide (length/width ratio 2.02), ventral side with a pecten armed with 15-24 rather small denticles, produced, long, curved; denticle 1 large, acuminate, closer to femoral base than to apex; following denticles smaller and decreasing in size; when leg flexed tibia positioned on lateral side of pecten; prepectenal ridge shorter than pecten, without spines, with a protuberance positioned on lateral side of metatibia when leg flexed; lateral side with small punctures, often hidden under setae. Metatibia evenly arcuate (angle >90°); three strong ventral carinae; lateral, dorsolateral carinae, mesal, and dorsomesal carinae obsolete; mucro long; tibial corona with two calcaria originating in the depression on dorsal side of mucro; spur not visible in lateral view. Mesotarsus 1 slightly shorter, but about as wide as metatarsus 1. Apex of mesosternal process without cleft, not slanting, initially projecting at 90° angle from body plane, at apex sharply curved back (with almost 90° angle) towards plane of metasternum; metaspinasternum feebly produced.

Abdomen. Sternum 1 about as long as remaining sterna. Pygidium punctulate, convex in lateral view, slightly longer than wide (length/width ratio mean 1.11), wider at base than apex, partly hidden by elytra, elytra cover 5-50% length of pygidium from base, in less than 90° angle to elytron, visible in dorsal view.

Genitalia. Median lobe (Fig. 122) slender. Ventral valve long with sides forming a triangle with an acute angle. Armature of internal sac with small, very weak median sclerites; with two short, elongate, basal sclerites, with numerous small denticles. Lateral lobes (Fig. 123) confluent, not separated, but with very large (for the subfamily) cleft, extending to 0.5 length of distance apex to Kingsolver's band; cutis partly surrounding apex on dorsal side of median lobe.

Females.— Similar to males, but maximum thoracic depth slightly larger. Antennal segments shorter (especially segments 9-11), segment 3 usually not even feebly serrate. Armature of bursa copulatrix and apodeme of spiculum gastrale (Fig. 126).

Specific Records.— Host records are from collection labels, spelled exactly as written, and should be verified. Bolivia: Beni, Ivon, 1921-1922, M.R. Lopez (USNM). Brazil: Acre, Guanabara, Rio Grande, X.1960, F.M. Oliveira (UFDP); Maranão, Imperatriz, 1.1973, (UFDP); Amazonas, INPA, 29.V.1976, Diaz (CDJ); Espirito Santo, Conceição da Barra, X.1972, M. Alvarenga (CMNH); Espirito Santo, Linhares, IX.1978, M. Alvarenga (CMNH); Espirito Santo, Linhares, 20.XI.1971, A.C. Domingos (UFDP); Espirito Santo, Linhares, 9-15.X.1975, C.

Elias (UFDP); Rio de Janeiro, (CMNH); Pará, Santarem, (CMNH); Pará, Tiriós, Alty Parú d'Oeste, I-II.1963, Machado & Pereira (USNM); Pará, Itaituba, Rio Tapajos, 9.10.63, (UFDP). Ecuador: Napo, Limoncocha, 41970, Hesp. (USNM); Napo, Limoncocha, 16.VII.1972, P.L. Kazan (FDA); Napo, Limoncocha, 15.VII.1977, W.E. Steiner (USNM); Napo, Rivers Napo & Aguarito, alt. 200m, (USNM). French Guiana: Cayen, D. Gehin, *paratype C. priocerus*, (NR); Cayenne (UZMC); Cayenne, Bot. Garden, 16.II.1959, A.M. Nadler (AMNH); Cayenne, I.1917, III.1917, (CMNH); Piste de St. Elie, pk 15, ex *Astrocaryum* seeds, 20.III.1986, Plinio (USNM); Maroni River, Schuns (USNM); Hwy D6 to Kaw, 33.5km SE of Rours, I.1986, G. Tavskilian (RIL). Guyana: Essequibo R., Moraballi Creek, 17.IX.1929, (BMNH); Tumatumari, Rio Potaro, IV.1912, (AMNH); quarantine Coral Gables, ex seed *Astrocaryum* (FDA). Peru: Loreto, Jennaro-Herrera, *Astrocaryum* sp., 28.VIII.90, Nov-Dec.1990, A. Delobel (ORST); Loreto, Jungle Amazon Inn, 30mi [50km] E. Iquitos on Amazon river, 30.III.1984-31985, P. Shelley (FDA); Reared palm seeds, 19-18-89 (Ad. III-90), Miami 086316, (USNM). Surinam: Brokopondo, 301969, L. & C.W. O'Brien (CDJ); quarantine New York, ex *Astrocaryum huicunga* Dammer ex Burret nuts, (USNM).

COMPARISONS OF SPECIES IN *CARYOBORUS*

Caryoborus gracilis has a very distinct median lobe, the apical triangle is extremely acute, not so in *C. chiriquensis* or *C. serripes*, and the internal sac has very distinct sclerites (Fig. 120). The male genitalia of *C. chiriquensis* and *C. serripes* are rather similar. The external characters of *C. gracilis* are often intermediate between the other two species. The antennae are much slenderer on *C. gracilis*, while the antennae are much longer (and the individual segments are much wider) on *C. serripes*. The number of denticles on the pecten is 14-16 in *C. gracilis*, 7-14 in *C. chiriquensis* and 14-24 in *C. serripes*. For morphometrical comparisons see Table 2; note the longer pygidium of *C. gracilis*.

Several specimens have been found with external and genitalic characters that are intermediate between *C. chiriquensis* and *C. gracilis*, and *C. chiriquensis* and *C. serripes*. The speciation process is probably rather recent, ongoing and hybrids therefore probably exist. The male genitalia are distinct, so they are considered to be distinct species, pending further study.

Genus **CARYOBRUCHUS** Bridwell

Caryobruchus Bridwell 1929:148.

Type species: *Dermestes gleditsiae* Johansson and Linné 1763. Original designation.

Elongated beetles. Integument usually dark brown, setae sparse with uniform whitish color. Head short, constricted behind eye; vertex with sharp or diffuse median carina, sometimes partly covered by setae; eye large, bulging, extending to both dorsal and ventral sides of head; ocular sinus vague; submentum tapering, posterior part wide, subtriangular, converging between eye and gena. Antennal segments 4-10 serrate. Pronotum subrectangular, transverse, base and apex about the same width; disk with surrounding impressed marginal line; lateral carina complete, extending from base to apex. Prosternum with long process (Figs. 46, 47), completely separating procoxae. Mesosternum with long process (Figs. 41, 42), noncleft. Elytron elongate, approximately three times longer than wide. Scutellum square, truncate apically. Metafemur incrassate, elongate; dorsal side nongranulate; ventral side pectinate; pecten produced, straight, with denticles, denticle 1 acuminate, larger than the other denticles, located beyond middle of femur; when leg flexed tibia positioned on lateral side of pecten; prepectenal ridge with spines, without a protuberance. Metatibia arcuate; three strong ventral carinae, middle carina without tubercle and sulcus; lateral and dorsolateral carinae obsolete; mesal and dorsomesal carinae obsolete; mucro at apex, without apical calcaria. Median lobe usually broad, sometimes slender, with large median and basal sclerites. Lateral lobes confluent, not separated, without cleft, apex with vague median notch and a fine line- or fold-like sinus (Figs. 141, 144, 147, 150, 153, 156); without gemmae; Kingsolver's band present.

The following six species of *Caryobruchus* are considered valid: *C. curvipes* (Latreille), *C. gleditsiae* (Johansson and Linné), *C. marieae* Nilsson and Johnson, *C. maya* Nilsson, new species, *C. rubidus* (Chevrolat), and *C. veseyi* (Horn).

KEY TO SPECIES OF *CARYOBRUCHUS*

1 Inner ventral carina strongly elevated from middle of metatibia (Fig. 11, 76); large pecten (Fig. 76); pygidium as long as wide; antennal segments 4-10 wide (length = width) (Fig. 92); genitalia as in Figs. 142 & 143, apex of median lobe forming an acute angle; metafemur length/width ratio mean 1.79. **C. marieae** Nilsson and Johnson

— Inner ventral carina on metatibia not strongly elevated; pecten of normal size; pygidium wider than long (Fig. 65); genitalia not as above, apex of median lobe usually forming a obtuse angle (Fig. 140) (in *C. veseyi* (Fig. 146) the angle is acute but not as much as in *C. marieae*); metafemur length/width ratio mean 1.90 or more **2**

2 (1) Metafemur much longer than wide (length/width mean ratio 2.60); antennal segments 4-10 long, slender, non-serrate or mostly so (Fig. 90); genitalia as in Figs. 145 & 146 . . . . **C. veseyi** (Horn)

— Metafemur longer than wide (length/width ratio mean 1.90-1.94); antennal segments 4-10 serrate, longer than wide (Figs. 89, 91, 93, 94); genitalia not as above **3**

3 (2) Genitalia as in Figs. 151 & 152; segment 3 of maxillary palp long, slender; eyes on dorsal side of head approximate . . . . **C. maya** Nilsson

— Genitalia not as above; segment 3 of maxillary palp not slender; eyes on dorsal side of head distant **4**

4 (3) Genitalia as in Figs. 139 & 140; segment 3 of maxillary palp shorter, wide; setae on elytron and pronotum whitish, not dense . . . . **C. gleditsiae** (Johansson and Linné)

— Genitalia not as above; Segment 3 of maxillary palp intermediate; setae on elytron and pronotum usually dense **5**

5 (4) Genitalia as in Figs. 148 & 149; setae on elytron and pronotum light yellowish brown, very dense (often giving a smudged appearance to the beetle) . . . . **C. curvipes** (Latreille)

— Genitalia as in Figs. 154 & 155; setae on elytron and pronotum white, often dense . . . . **C. rubidus** (Chevrolat)

Caryobruchus curvipes (Latreille)

Figs. 4, 78, 89, 98, 148 - 150

Bruchus curvipes Latreille 1811:234. **Neotype designated.**
Caryaborus(sic) *testaceus* Motschoulsky 1874:246. **New synonymy.**
Pachymerus testaceus: Pic 1913:9.
Caryobruchus testaceus: Bridwell 1929:155.

Type Data.—Type locality: Michoacan, Mexico. Holotype, lost. Neotype female, near La Huacana, Michoacan, Mexico, 23.X.1987, ex seeds of *Sabal pumos* (H.B. & K.) Burret, S. Zona, *Bruchus curvipes* Latreille, neotype by Jan Arne Nilsson 1992; deposited in the U.S. National Museum of Natural History, Washington, D.C. Neoparatype female, same data as neotype. The name is a **nomen dubium** since two species have been referred to by this name in the literature (Germar 1818a, 1818b). A neotype is necessary in the interest of stability of nomenclature to separate the types of *Bruchus curvipes* Latreille 1811, and *Bruchus ruficornis* Germar 1818. The beetle collection of Latreille has disappeared, and so the holotype of *Bruchus curvipes* is lost. In 1929, Latreille's collection of Coleoptera was housed in Manchester, United Kingdom, but has since been sold to an unknown buyer (pers. comm. S.L. Shute, The Natural History Museum, London). The original description, host record, and collection locality make it very likely that *C. testaceus* is conspecific with *C. curvipes*. Two specimens collected from the type locality of *Bruchus curvipes* were studied. These were reared from fruits of *Sabal pumos* (H.B. & K.) Burret, the species of palm from which the original Latreille specimens of *Bruchus curvipes* were reared. The type locality of the host palm is the same as the type locality for the beetle, near the Jorullo Volcano and the town of La Huacana, in the state of Michoacan (Zona 1989). One of the specimens collected at the original type locality (Zona 1989) of both the insect and the palm host (Latreille 1811), a female, is here designated a neotype. *Caryoborus testaceus*. Holotype male, Am. cent. Mots.; deposited in the Moscow State University, Zoological Museum, Moscow (MOSC).

Distribution .—(Fig. 4). Specimens examined, 60. Guatemala (Petén), Mexico (Chiapas, Oaxaca, Sinaloa).

Diagnosis.— Integument medium to dark reddish-brown, medium texture, beige or light yellowish-brown pubescence. Males 6.0-11.9 mm, females 6.5-12.3 mm in length (pronotum-elytra); width of males 3.4-6.2 mm, females 3.8-6.6 mm, maximum thoracic depth of males 3.7-4.7 mm, females 3.9-4.4 mm. Eyes distant. Antennal segments 4-10 serrate, segments longer than wide. Disk of pronotum wider than long (length/width ratio mean 0.73). Metafemur almost twice as long as wide (length/width ratio mean 1.92); pecten short with 8-10 denticles, denticle 1 acuminate and longer; prepectenal ridge longer than pecten, with 7-11 small, usually acute, spines. Metatibia with inner ventral carina not elevated. Pygidium wider than long (length/width ratio mean 0.70).

Males.—Integument. Hirsute, base of each seta in a minute puncture (therefore minutely punctulate where setae have been removed). Gula, ventral part of gena, apical end of proepimeron (with golden setae lining the margin), metacoxa near trochanter, and part of mesal side of metafemur glabrous. *Color.* Body and appendages uniform medium brown to dark reddish-brown.

Vestiture. Setae often lost on parts of the body, possibly due to rubbing. Dorsal and ventral body surfaces with beige or light yellowish-brown, medium texture, short, recumbent, moderately dense, uniform setae, color strongest yellow on apical end of elytron and metafemur; antenna with minute white setae; elytron moderately hirsute; sparse setae on ventral ridge of metafemur not covering the pecten; protibia and mesotibia with coarse, golden, moderately dense to dense setae apically; metatibia lacking golden setae except a few golden setae inside apex of mucro; tarsomere 1 with moderately dense, golden setae, ventral side of tarsomere 3 with very dense, coarse, golden setae; pygidium as densely hirsute as elytron, but setae longer. Setae often very dense giving the beetle a smudged appearance.

Head. Usually shorter but sometimes almost as long as pronotum; frons and vertex with prominent median glabrous carina, carina at vertex not interrupted by a weak depression; ocular sinus vague; on dorsal side eyes distant; postocular lobe medium-sized; antenna shorter than elytron, segments 4-10 serrate longer than wide; maxillary palp segment 3 less than twice as long as segment 2 and somewhat narrow; gena long; sides of submentum only feebly converging triangularly between eyes; on ventral side eyes distant.

Prothorax. Disk wider than long (length/width ratio mean 0.73); sparsely punctate; all sides with strong, impressed, marginal line, anterior margin straight or feebly emarginate; angles usually rounded, sometimes not visible in dorsal view; medial dorsal surface usually flattened, sides depressed, more depressed toward apex, either arcuate or angulate, narrowed to apex from slightly more than middle of side; angles of lateral margin at base produced, angle usually less than 90°; posterior margin arcuate, produced medially; strong lateral prothoracic carina complete, extending from head to elytron. Protarsus 1 shorter and wider than metatarsus 1 (sexual dimorphism: not wider in females). Prosternum completely separating procoxae, apex of prosternal process of intermediate width.

Mesothorax and Metathorax. Scutellum small, subquadrate. Elytron with dorsal surface usually convex between humerus and mesal margin, depressed laterally and apically; humerus non-scabrous; striae punctate. Metafemur incrassate, maximum width slightly closer to base, constricted toward apex, almost twice as long as wide (length/width ratio mean 1.92), ventral side with a pecten armed with 8 - 10 denticles, produced, short, straight; denticle 1 large, acuminate, closer to femoral apex than to base; following denticles smaller and decreasing in size; when leg flexed, tibia positioned on lateral side of pecten; prepectenal ridge longer than pecten, with 7-11 small, usually acute spines; lateral side with small punctures, usually hidden under setae. Metatibia evenly arcuate (angle >90°); three strong ventral carinae, inner carina very strong, wide tibial furrow between inner and middle carinae, middle carina strong, very close to and fusing with outer at mucro, outer carina very strong; lateral, dorsolateral, mesal and dorsomesal carinae obsolete; mucro medium size; tibial corona smooth, without spines; spur barely visible in lateral view, sparsely covered with setae. Mesotarsus 1 shorter and slightly wider than metatarsus 1. Mesosternal process not slanting, projecting to almost 90° angle from body plane, apex not curved back towards plane of metasternum; metaspinasternum only feebly produced.

Abdomen. Sternum 1 about as long as remaining sterna. Pygidium punctulate, feebly convex in lateral view, wider than long (length/width ratio mean 0.70), wider at base than apex, in almost 90 degrees angle to elytron, usually hidden by the elytra and not visible in dorsal view.

Genitalia. Median lobe (Fig. 149) broad. Ventral valve short with sides forming a triangle with an obtuse angle. Armature of internal sac with two median, long curved sclerites, one arm acute at apex, serrate at apex and near base; two large, wide, serrate basal sclerites. Lateral lobes (Fig. 150) confluent, not separated, without cleft, apex with median notch, line-like sinus extending from notch to 0.6 length of distance apex to Kingsolver's band.

Females.— Similar to males, maximum thoracic depth often slightly larger; protarsus 1 not as wide (sexual dimorphism). Armature of bursa copulatrix (Fig. 148) of two types: two curved, club shapes, apposed sclerites, wider at base; and one long, rodlike, wider at base, with a cleft on the dorsal side.

Specific Records.—Host records are from collection labels, spelled exactly as written, and should be verified. Guatemala: El Petén, 1922, H.F.Loomis (USNM); Uaxactum, ex Botan palm, 28.III.1922, H.L. Loomis (USNM); Uaxactum, El Petén, ex Botan palm 18.III.1922, H.F. Loomis (USNM). Mexico: Chiapas, ex palmetto, XII.1906, Collins & Doyle (USNM); Chiapas, Tuxtla Gutierrez, X.1987, D.B. Thomas (RIL); Michoacán, seeds of *Sabal pumos* (H.B. & K.) Burret, 23.X.87, S. Zona (ZONA); Oaxaca, Temascal, at light, 30.V.1964, D.H. Janzen (CDJ); Sinaloa; 14mi [22km] NW Rosario, reared from seeds of palm, VII.23.65, C.D. Johnson (CDJ).

Discussion.—Bonpland collected palm fruits from a new species of palm, given the name *Corypha pumos* by Kunth (Humboldt, Bonpland and Kunth 1815), later *Sabal pumos* (H.B. & K.) Burret (Zona 1990). The beetles which emerged from most of the fruits were named *Bruchus curvipes* by Latreille; (1811). The type has disappeared. However, two female specimens of *Caryobruchus* have been collected at the type locality of *Corypha pumos* (H.B. & K.) Burret. With the host record, collection locality and the original description it can be assumed that the beetles described by Latreille and these two specimens are conspecific. It is often preferable to designate male bruchids as types, but for species in *Caryobruchus* the female genitalia have been found to have excellent characters for use in identification to species. For this reason, one of the female specimens has been designated as the neotype.

Caryobruchus gleditsiae (Johansson and Linné)

Figs. 3, 56, 57, 75, 91, 97 - 100, 139, 140, 141

Dermestes gleditsiae Johansson and Linné 1763:9; Johansson and Linné 1789:392.
Bruchus gleditsiae: Linné 1767:605.
Pachymerus gleditsiae: Pic 1913:7.
Caryobruchus gleditsiae: Bridwell 1929:155; Udayagiri and Wadhi 1989:239; Nilsson and Johnson 1990:51.
Bruchus arthriticus Fabricius 1801:398.
Caryoborus arthriticus: Schönherr 1833:93.
Bruchus fuscus Goeze 1977:332; Decelle 1966:172 (synonym?).

Type Data.—Type locality: Amer. The holotype of *Dermestes gleditsiae* has disappeared. The insect at the Linnean Society in London is probably not the specimen used by Johansson and Linné for the original description and should not be considered the holotype. But there is no question about the identity of this species as it is the only species of palm bruchid occurring in the United States, and the name has been accepted for this species by bruchid researchers. No paratypes. *Bruchus arthriticus*. Holotype; deposited in Universitetets Zoologisk Museum, Copenhagen (UZMC). *Bruchus fuscus*. Holotype; deposited in Muséum National d'Histoire Naturelle, Paris (MNHP).

Distribution .—(Fig. 3). Specimens examined, 2480. Bahamas, Bermuda, Cuba, Dominica, Dominican Republic, El Salvador, Guatemala, Honduras, Jamaica, Mexico (Campeche, Chiapas, Guerrero, Hidalgo, Michoacan, Nayarit, Oaxaca, Puebla, San Luis Potosi, Sinaloa, Sonora, Tamaulipas, Veracruz), Panama, United States (Alabama, Florida, Georgia, Louisiana, Mississippi, Texas).

Diagnosis.— Integument dark brown, sometimes slightly reddish (this is usually the color of specimens collected on Cuba), sparse white or yellowish-white pubescence. Males 7.2-12.1 mm, females 4.3-11.0 mm in length (pronotum-elytra); width of males 3.6-6.2 mm, females 2.2-5.4 mm, maximum thoracic depth of males 2.3-3.7 mm, females 1.5-3.6 mm. Eyes distant. Antennal segments 4-10 serrate, longer than wide. Disk of pronotum disk wider than long (length/width ratio mean 0.69). Metafemur almost twice as long as wide (length/width ratio mean 1.94); pecten short with 7-12 denticles, denticle 1 acuminate and longer; prepectenal ridge longer than pecten, with 7-13 small acute spines. Metatibia with inner ventral carina not elevated. Pygidium wider than long (length/width ratio mean 0.74).

Males.—*Integument.* Hirsute, base of each seta in a minute puncture (therefore minutely punctulate where setae have been removed), some structures glabrous. Gula, ventral part of gena, apical end of proepimeron (with golden setae lining the margin), metacoxa near trochanter, and part of mesal side of metafemur glabrous. *Color.* Body and appendages uniform dark brown, sometimes slightly reddish.

Vestiture. Setae often lost on part of the body, possibly due to rubbing. Dorsal and ventral body surfaces with white or yellowish-white, medium texture, recumbent, moderately dense, uniform setae; antenna with minute white setae; sparse setae on elytron; sparse setae on ventral ridge of metafemur not covering pecten; protibia and mesotibia with coarse, golden, moderately dense to dense setae apically; metatibia lacking golden setae except a few golden setae inside apex of mucro; tarsomere 1 with moderately dense, golden setae, ventral side of tarsomere 3 with very dense, coarse, golden setae; pygidium not as densely hirsute as elytron.

Head. Shorter or about as long as pronotum; frons and vertex with median glabrous carina; ocular sinus vague or lacking; on dorsal side eyes distant; postocular lobe short; antenna shorter than elytron, segments 4-10 serrate, clearly longer than wide; maxillary palp segment 3 less than twice as long as segment 2 and somewhat wide; gena long; sides of submentum only feebly converging triangularly between eyes; on ventral side eyes distant.

Prothorax. Disk wider than long (length/width ratio mean 0.69); moderately punctate; all sides with strong, impressed, marginal line, anterior margin usually emarginate; angles produced, visible in dorsal view; medial dorsal surface usually flattened, sides depressed, sharply depressed toward apex, arcuate, narrowed to apex from slightly more than middle of side; angles of lateral margin at base sharply produced, angle more than 90°; posterior margin arcuate, feebly produced medially; strong lateral prothoracic carina complete, extending from base to apex. Protarsus 1 shorter and wider than metatarsus 1 (sexual dimorphism: not wider in females). Prosternum completely separating procoxae, apex of prosternal process medium width.

Mesothorax and Metathorax. Scutellum small, subquadrate, often slightly longer than wide. Elytron with dorsal surface often slightly flattened between humerus and mesal margin, depressed towards sides and apex; humerus non-scabrous; striae punctate. Metafemur incrassate, maximum width closer to base, constricted toward apex, almost twice as long as wide (length/width ratio mean 1.94), ventral side with a pecten produced, short, straight, armed with 7-12 denticles; denticle 1 large, acuminate, closer to femoral apex than to base; following denticles decreasing in size; when leg flexed tibia positioned on lateral side of pecten; prepectenal ridge longer than pecten, with 7-13 small acute spines; Metatibia arcuate, bending with an even arc (angle >90°); three strong ventral carinae, inner carina strong at base and mucro and moderately deep tibial furrow between inner and middle carinae, middle carina strong at base (weak at mucro in some specimens) and fusing with outer carina just before mucro, outer carina strong at base and mucro; lateral, dorsolateral, mesal and dorsomesal carinae obsolete; mucro medium size; tibial corona smooth, without spines; spur only slightly visible in lateral view. Mesotarsus 1 shorter, but only slightly wider than metatarsus 1. Mesosternal process vaguely slanting, projecting with less than 90° angle from body plane, apex usually feebly curved back towards plane of metasternum; metaspinasternum only feebly produced.

Abdomen. Sternum 1 about as long as remaining sterna. Pygidium punctulate, moderately convex in lateral view, wider than long (length/width ratio 0.74), wider at base than apex, at almost 90° angle to elytron, but most often not completely hidden by the elytra and thus partially visible in dorsal view.

Genitalia. Median lobe (Fig. 140) broad. Ventral valve long with sides forming a triangle with an obtuse angle. Armature of internal sac with two large, median, Y-shaped sclerites with one arm acute at apex and branched at less than right angle; two basal, straight or slightly curved serrated sclerites. Lateral lobes (Fig. 141) confluent, not separated, without cleft, apex with vague median notch, fold-like sinus (see Fig. 141) extending from notch to 0.5 length of distance apex to Kingsolver's band.

Females.— Similar to males, maximum thoracic depth usually slightly larger, protarsus 1 not as wide (sexual dimorphism). Armature of bursa copulatrix (Fig. 139) of two types: two apposed ventral sclerites, but widely separated at base, mushroom-shaped; and one dorsal sclerite, long, rodlike, wider at base, base of sac swollen, bulblike.

Specific Records.—Only records with host plant associations included. Host records are from collection labels, spelled exactly as written, and should be verified. Natural hosts probably *Sabal* palms. Bermuda: Nonsuch Island, ex *Sabal bermudana* L.H. Bailey, VI.1988, S. Zona (ZONA). Cuba: A da Costa Lima, ex *Copernicia ? hospita* Mart., VIII.49, (BMNH); Camaguey, ex *Copernicia hospita* Mart., 1948, B.F. Dahlgren (FMNH); Camaguey, 5mi [8km] N of

Cabeza de Vaca, ex *Copernicia torrans*, B.F. Dahlgren (FMNH); Camaguey, Nuevitas road between Minas and Nuevitas, ex *Copernicia hospita* Mart., 28.VIII.1949, (FMNH); El Coca, ex *Sabal florida*, 6.II.1948, B.F. Dahlgren (FMNH); Camaguey, Nuevitas road between Minas and Nuevitas, ex *Copernicia rigida* Britton & Wilson, 24.VIII.1949, B.F. Dahlgren (FMNH); Guanabacoa, Havana, ex *Copernicia inderoglossa*, X.1929, H. Leon (USNM); Habana, with seed of *Copernicia torreana* León, quarantine Washington, D.C., (USNM); ex *Copernicia* sp., B.E. Dahlgren (BMNH); Guanabaeva, ex palm yata, (AMNH); with seeds of *Copernicia rigida* Britton & Wilson, (USNM); with seeds of *Copernicia sueroana* León, (USNM). Dominican Republic: San Cristóbal Prov., 9.IX.1969, (TAM); ex *Inodes neglecta*, (USNM). El Salvador: quarantine from San Salvador, ex native palm, 3.VI.1929, (USNM); quarantine, San Salvador, ex *Sabal* sp., interc. 29.VII.77, (USNM). Haiti: ex *Sabal domingensis* (type *S. haltensis*), (ZONA). Honduras: quarantine Miami, ex *Chamaedorea seifrizii* Burret seed, (USNM). Jamaica: St. Thomas, Morant Point, ex dead *Thrinax* sp. fronds, 15.V.1965, T.H. Farr (USNM). Mexico: Chiapas, quarantine Laredo, on *Chamaedorea* seed, intercepted 8.IV.57, (USNM); Michoacan, La Gallina, 1.XI.80, 880 msnm S-144, ex *Sabal*, Atkinson & Equihua (JRN); Nayarit, 13mi [21km] SE of Acaponeta, ex palm, 12.VII.1968, C.D. Johnson (CDJ); Nayarit, San Blas turnoff, ex palm, 11.VII.1968, C.D. Johnson (CDJ); Sinaloa, 18mi [29km] SE of Escuinapa, ex palm, 26.VIII.1965, C.D. Johnson (CDJ); Sinaloa, ex *Sabal rosei* Becc., VIII.1988, S. Zona (ZONA); Sonora, San Carlos Bay, by the beach, 23.VII.1988, ex *Sabal uresana* Trel., J.A. Nilsson (JAN); Sonora, ex *Sabal uresana* Trel., S. Zona (ZONA); Veracruz, km 14, federal road 180 (Veracruz-Alvarado), Rancho Las 3M, fallen seeds *Sabal mexicana* Mart., 15.Jan.1978, Silvia Olvera (CDJ); Veracruz, 24km S of Veracruz, by hwy 180, seeds on ground, *Sabal mexicana* Mart., V.1990, J.A. Nilsson (JAN). St. Croix: ex seed *Coccothrinax argentata* (Jacq.) Bailey, (USNM). United States: Florida, Alachua County, 1.VII.1978, ex *Sabal palmetto* (Walt.) Lodd. ex Schult, T.H. Atkinson (FDA); Florida, Alachua County, Gainesville, ex *Sabal* sp., 11.IV.1934, L.J. Bottimer (CNC); Florida, Alachua County, Gainesville, ex *Phoenix sylvestris* (L.) Roxb., 11.VII.1960, L.J. Bottimer (CNC); Florida, Brevard County, ex palmetto, 8.IV.1937, Dyson & Setzer (FDA); Florida, Citrus County, in palmetto litter, 27.III.1965, R.E. Love (UGA); Florida, Dade County, Homestead, ex "Royal Palm", 21.VI.1965, C. O'Brien (CDJ); Florida, Dade County, Florida City, ex "Silver Palm", 11.III.1920, M. Hebard (ANSP); Florida, Dade County, Everglades national Park, ex *Coccothrinax argentata* (Jacq.) Bailey, IV.1960, F.C. Craighead (CNC); Florida, Dade County, Coral Gables, Fairchild Tropical garden, ex *Sabal longipedunculata*, 7.V.1960, Woodruff & McFarlin (FDA); Florida, Dade County, Coral Gables, Fairchild Tropical Garden, Coconut Grove, ex *Sabal parviflora* Becc., 22.VIII.1960, L.J. Bottimer (CNC); Florida, Dade County, Coral Gables, Fairchild Tropical Garden, Coconut Grove, ex *Sabal yapa* C. Wright ex Becc., 22.VIII.1960, L.J. Bottimer (CNC); Florida, Dade County, Coral Gables, Fairchild Tropical Garden, Coconut Grove, ex *Sabal causiarum* O.F. Cook, 24.VIII.1960, L.J. Bottimer (CNC); Florida, Dade County, Coral Gables, Fairchild Tropical Garden, Coconut Grove, ex *Coccothrinax*, 24.VIII.1960, L.J. Bottimer (CNC); Florida, Dade County, Coral Gables, Fairchild Tropical Garden, Coconut Grove, ex *Livistonia chinensis* R. Br., 24.VIII.1960, L.J. Bottimer (CNC); Florida, Dade County, Coral Gables, Fairchild Tropical Garden, Coconut Grove, ex *Thrinax*, 29.VIII.1960, L.J. Bottimer (CNC); Florida, Dade County, Coral Gables, Fairchild Tropical Garden, Coconut Grove, ex *Sabal parviflora* Becc., L.J. Bottimer (CNC); Florida, Highlands County, Childs, *Tillandsia fasciculata*, 23.V.1949, B. Patterson (FMNH); Florida, Highlands County, Lake Placid, ex *Sabal etonia* Swingle ex Nash, 6.II.1961, F.C. Craighead (CNC); Florida, Lee County, Koreshan State Park, ex palmetto, 7.V.1976, O'Brien & Marshall (CAS); Florida, Levy County, ex *Yucca smalliana*, 30.VI.1956, H.V. Weems Jr. (FDA); Florida, Marion County, Ocala National Forest, ex *Sabal etonia* Swingle ex Nash, VII.1974, (FDA); Florida, Monroe County, Marathon, ex *Thrinax microcarpa* Ruiz & Pav., 31.V.1960, L.J.Bottimer (CNC); Florida, Monroe County, Big Pine Key, ex *Thrinax microcarpa* Ruiz & Pav., 2.V.1960, L.J. Bottimer (CNC); Florida, Orange County, Orlando, ex palmetto, 28.II.1930, L.J. Bottimer (CNC); Florida, Osceola County, ex *Sabal palmetto* (Walt.) Lodd. ex Schult, XI.1988, S. Zona (ZONA); Florida, Polk County, Lake Martha, ex *Sabal palmetto* (Walt.) Lodd. ex Schult, 21.IV.1951, B.E. Dahlgren (FMNH); Florida, Polk County, Frostproof, ex *Sabal etonia* Swingle ex Nash, 22.V.1982, S. Zona (ZONA); Florida, Washington County, ex *Sabal palmetto* (Walt.) Lodd. ex Schult, (COR); Georgia, Fulton County, Atlanta, ex *Sabal* *minor* (Jacq.) Pers., (COR); Louisiana, Ascencion County, Gonzales, ex *Sabal glabra* Sargent, 5.XI.1927, C.A. Brown (LSU); Louisiana, East Baton Rouge County, Baton Rouge, ex palmetto, X.1927, C.A. Brown (LSU); Louisiana, Plaquemines County, ex *Sabal minor* (Jacq.) Pers., 20.X.1979, S. Doughty (LSU); Texas, Bowie County, Texarkana, ex palmetto, G.W. Blaydes (USNM); Texas, Cameron County, Sabal Palm Grove Sanctuary, Southmost, bl trap, 6-9.X.1981, R. Turnbow (TURN); Texas, Cameron County, SW Brownsville close to Audubon Palm Refuge, ex *Sabal mexicana* Mart., 17.V.1988, J.A. Nilsson (JAN); Texas, Cameron County, Brownsville, ex *Phoenix*, 13.IV.1961, L.J. Bottimer (CNC); Texas, Crosby County, 25.II (no year), ex *Sabal glabra* Sargent, L.J. Bottimer (UA); Texas, Crosby County, ex *Sabal* sp., 26.XI.1924, L. J. Bottimer (CNC); Texas, Hidalgo County, Edinburg, Pan American University campus, ex *Sabal mexicana* Mart., 18.V.1988, J.A. Nilsson (JAN); Texas, Hidalgo County, McAllen, ex *Sabal mexicana* Mart., 4.VI.1990 (emerged 11.VI.1990), J.A. Nilsson (JAN); Texas, Hidalgo County, N of Mission, by hwy 107, ex *Washingtonia robusta* Wendl., 16.V.1988, J.A. Nilsson (JAN); Texas, Hidalgo County, Pharr, by El Centro mall, seed on ground *Sabal mexicana* Mart., 22.XII.1988, J.A. Nilsson (JAN); Texas, Hidalgo County, Pharr, seeds on ground, 16.VII.1989 (emerged 5.X.1989), J.A. Nilsson (JAN); Texas, Kleberg County, Kingsville, Texas A&I University campus, ex *Sabal* sp.seeds on ground, 7.VII.1989, J.A. Nilsson (JAN); Texas, Kleberg County, Riviera Beach, 21.X.1984, R. Turnbow (TURN); Texas, Starr County, Rio Grande City, planted esplanade palms, ex *Sabal* sp. with black shiny seeds (not looking like *Sabal mexicana* Mart. seeds), VIII.1988, 18.VII.1989, J.A. Nilsson (JAN); Texas, Walker County, Lake Stubblefield, ex *Sabal minor* (Jacq.) Pers., 3.IX.1971, W.E.Clark (CDJ); Texas, Webb County, Laredo, TX Tourist Bureau, ex *Phoenix* sp., 23.VIII.1988, J.A. Nilsson (JAN).

Discussion.—Linné has incorrectly been designated as the only author of this species. Usinger (1964) stated: "According to the custom of the time, Linnaeus is cited as "author" of these [theses] and it would be quite impossible in any given case to determine which parts of a thesis were transcribed lecture notes and which represented original ideas or observations of the student. The theses were published separately and then collected theses of all his students were reprinted several times, the Schreiber edition (3rd) appearing in ten volumes under the title "Amoenitates Academicae." Linné might have been responsible for the name, since it is mentioned in a letter to N.J. Jacquin; (1762), but a description prior to Johanssons description (1763) does not exist. We give Johansson credit as first author and Linné as second author. The correct citation should be *Dermestes gleditsiae* Johansson and Linné 1763. The type in the collection of Linné in London is probably not the original type. The label on the specimen in the collection does not have the same data as indicated by the original description. This is not surprising since insects named by Linné were often not represented by a type specimen, and if a "type" existed it was often replaced by specimens in "better" condition after the death of Linné (Usinger 1964). Since Linné did not himself describe *C. gleditsiae*, a "type" was most likely placed in the collection after the death of Linné in 1783. We do not regard the insect in the Linnaean Collection as the holotype.

Caryobruchus marieae Nilsson and Johnson

Figs. 3, 11, 23, 24, 76, 92, 142 - 144

Caryobruchus marieae Nilsson and Johnson 1990:55.

Type Data.—Type locality: Habana, Cuba. Holotype male, Cuba, Habana, *Sabal parviflora* Becc., quarantine 28.11.1932; deposited in the U.S. National Museum of Natural History, Washington, D.C. (USNM). Allotype female, Cuba; deposited in USNM. Paratypes, 24.

Etymology.— Named in honor of Marie Simonsson.

Distribution .—(Fig. 3). Specimens examined, 26. Cuba.

Diagnosis.— Integument dark brown to almost black, sparse white pubescence. Males 7.2-8.3 mm, females 8.4-9.0 mm in length (pronotum-elytra); width of males 3.4-4.4 mm, females 4.4-4.8 mm, maximum thoracic depth of males 2.5-2.8 mm, females 3.0-3.2 mm. Eyes distant. Antennal segments 4-10 serrate, as wide as long. Disk of pronotum wider than long (length/width ratio mean 0.72). Metafemur less than twice as long as wide (length/width ratio mean 1.79). Pecten long, strongly produced with seven or eight denticles, denticle 1 acuminate and much longer; prepectenal ridge about as long as pecten, with 6-10 medium acute spines . Metatibia with inner ventral carina elevated at apical end creating a wide slanted tibial furrow at basal end of mucro. Pygidium about as wide as long (length/width ratio mean 1.00).

Males.—Integument. Hirsute, base of each seta in a minute puncture (therefore minutely punctulate where setae have been removed). Gula, ventral part of gena, apical end of proepimeron (with golden setae lining the margin), metacoxa near trochanter, and part of mesal side of metafemur glabrous. *Color.* Body and appendages varying from uniform dark brown to almost black.

Vestiture. Setae often lost on part of the body, possibly due to rubbing. Dorsal and ventral body surfaces with white, fine, very short, recumbent, moderately dense, uniform; antenna with minute white setae; sparse setae on elytron; sparse setae on ventral ridge of metafemur not covering pecten; protibia and mesotibia with coarse, golden, moderately dense to dense setae apically; metatibia lacking golden setae except a few golden setae inside apex of mucro; tarsomere 1 with moderately dense, golden setae, ventral side of tarsomere 3 with very dense, coarse, golden setae; pygidium not as densely hirsute as elytron. Elytra and pronotum disk almost non-hirsute in some specimens, possibly due to rubbing.

Head. About as long as pronotum, sometimes slightly longer; frons and vertex with median glabrous carina, carina at vertex not interrupted by a weak depression (Fig. 96); ocular sinus vague; on dorsal side eyes distant; postocular lobe short; antenna shorter than elytron, segments 4-10 serrate about as wide as long; maxillary palp segment 3 less than twice as long as segment 2 and of intermediate width; gena long; sides of submentum only feebly converging triangularly between eyes; on ventral side eyes distant.

Prothorax. Disk wider than long (length/width ratio mean 0.72); moderately to densely punctate; all sides with strong, impressed, marginal line, anterior margin feebly emarginate; angles rounded, often not visible in dorsal view; medial dorsal surface usually feebly convex, sometimes flattened; sides depressed, sharply depressed toward apex, parallel, narrowed to apex from slightly more than middle of side; angles of lateral margin at base produced; angle more than 90°; posterior margin arcuate, feebly produced medially; strong lateral prothoracic carina complete, extending from head to elytron. Protarsus 1 shorter and slightly wider than metatarsus 1 (sexual dimorphism: not wider in females). Prosternum completely separating procoxae, apex of prosternal process narrow.

Mesothorax and Metathorax. Scutellum small, subquadrate. Elytron with dorsal surface usually slightly flattened between humerus and mesal margin, depressed towards sides and apex; humerus non-scabrous; striae punctate. Metafemur incrassate, maximum width closer to base, constricted towards apex, almost twice as long as wide (length/width ratio mean 1.78), ventral side with a pecten armed with seven or eight denticles, strongly produced, only slightly shorter than prepectenal ridge; denticle 1 very large, acuminate, closer to femoral apex than to base; following denticles decreasing in size; when leg flexed, tibia on lateral side of pecten; prepectenal ridge approximately as long as pecten, with 6-10 medium acute spines. Metatibia evenly arcuate (angle >90°); three strong ventral carinae, inner carina strong at base and very strong and elevated from middle of tibia to mucro and deep tibial furrow between inner and middle carinae (furrow wide from elevated carina to mucro), middle carina strong at base and weaker at mucro and very close to and fusing with outer carina just before mucro, outer carina weak at base and stronger at mucro; lateral, dorsolateral, mesal, and dorsomesal carinae obsolete; mucro very large; tibial corona smooth, without spines; spur clearly visible in lateral view; mesotarsus 1 slightly shorter and slightly wider than metatarsus 1. Mesosternal process vaguely slanting, projecting to less than 90° angle from body plane, apex feebly curved back towards plane of metasternum; metaspinasternum only feeble produced.

Abdomen. Sternum 1 about as long as remaining sterna. Pygidium punctulate, moderately convex in lateral view, about as wide as long (length/width ratio mean 1.00), wider at base than apex, at almost 90° angle to elytron, often hidden by elytra and thus not visible in dorsal view.

Genitalia. Median lobe (Fig. 143) slender. Ventral valve long with sides forming a triangle with an acute angle. Armature of internal sac with two median, V-shaped sclerites with one arm acute at apex and branched from base of sclerite at about right angle; two basal inverted U-shaped, serrated sclerites. Lateral lobes (Fig. 144) confluent, not separated, without cleft, apex with vague median notch, line-like sinus extending to 0.5 length of distance apex to Kingsolver's band.

Females.— Similar to males, maximum thoracic depth usually slightly larger; protarsus 1 not as wide (sexual dimorphism). Armature of bursa copulatrix (Fig. 142) of two types; two small, short ventral sclerites, slightly wider at base; and one dorsal sclerite, wider at base, base of sac swollen, bulblike.

Specific Records.—Host records are from collection labels, spelled exactly as written, and should be verified. Cuba: *allotype* , (USNM); 1929, (JAN); 1929, Bruner & Boucle (USNM); X.1929, Bruner (USNM); Camacho, 1929, ex *Sabal* sp., Leon (USNM); Cayamas, 14.I, 3.III, 5.III, 13.III, 16.III (year unknown), E.A. Schwarz (USNM); Guanimar, 1929, ex *Sabal* sp., Leon (USNM); Habana, *Sabal parviflora* Becc., quarantine 28.11.1932, *holotype* , (USNM); Habana, ex *Sabal parviflora* Becc., (USNM); Oriente, Rio de Imias, X.1929, ex *Sabal* sp., Leon (USNM).

Discussion.—This species needs to be collected extensively. The latest collection date of specimens examined is 1932.

Caryobruchus maya Nilsson, **new species**

Figs. 5, 79, 93, 151 - 153

Type Data.—Type locality: 15km S. of Morocoy, Quintana Roo, Mexico. Holotype, Quintana Roo, 15km S of Morocoy, 19.VI.1990, R. Turnbow; deposited in the American Museum of Natural History, New York (AMNH). Allotype, Mexico, Campeche, 28km E. Xpujil, on burned cabbage palm, 29.VI.1990, R.Turnbow; deposited in AMNH. 38 paratypes. Belize: (1) (JAN); (1) C.F. Baker 1906 (USNM). Guatemala: (1) Petén, Tikal, 28.II.1956, #74, I.J. Cantrell (MIC); (1) Petén, Tikal, 28.VI.1974, W.E. Steiner (USNM); (1) interc. 4-21-1967, Houston 10962, ex *Chamaedorea elegans* Mart., S.H. Pruitt Coll. (USNM). Mexico: (5) Campeche, 28km E. Xpujil, on burned cabbage palm, 29.VI.1990, 19.VI.1990, R.Turnbow, (TURN); (1) Campeche, 4 km Xpujil, 30.V.1984, R.Turnbow (TURN); (1) Chiapas, hwy 180, 31km E of Villahermosa, 28.VI.1990, R. Turnbow (TURN); (2) Quintana Roo, 13 km N. Obregon, V.31 1984, J.E. Wappes (WAPP); (5) Quintana Roo, 15km S of Morocoy, 29.VI.1990, 19.VI.1990, R. Turnbow (TURN); (1) Quintana Roo, Hwy. 307, 95 km N junction Hwy, 186, 31.V.1984 (TURN); (1) Quintana Roo, Allen Point, Ascencion Bay, 17.IV.1960, J.F.G. Clarke (USNM); (13) Quintana Roo, Ascen. Bay, Sulimans Pt, Sta 7, 19.IV.1960, J.F.G. Clarke (USNM); (1) Yucatan, Itzimna, IX.9.1964, collectors J.C. & D. Pallister (AMNH); (1) interc. Brownsville, *Sabal*, 1.X.85, (USNM); (1) interc. at Brownsville, Tex., Sudduth taken in palm seed from Fortin, Veracruz, (USNM); (1) interc. New Orl. 42610, 9/16/67, in plane cargo hold 67-24808, (USNM).

Etymology.—Named, as a noun in apposition to *Caryobruchus*, after the Maya Indians who inhabited the same area as the beetles.

Distribution (Fig. 5).—Specimens examined, 40. Belize, Guatemala (Petén), Mexico (Campeche, Chiapas, Quintana Roo, Yucatan).

Diagnosis.— Integument dark brown, sometimes slightly reddish, sparse yellowish-white pubescence. Males 6.4-8.5 mm, females 6.6-8.3 mm in length (pronotum-elytra); width of males 3.7-4.5 mm, females 3.8-4.4 mm, maximum thoracic depth of males 2.5-2.8 mm, females 3.0-3.3 mm. Eyes approximate. Antennal segments 4-10 serrate, longer than wide. Disk of pronotum wider than long (length/width ratio mean 0.68). Metafemur almost twice as long as wide (length/width ratio mean 1.90); pecten short with 8-13 denticles, denticle 1 acuminate and longer; prepectenal ridge longer than pecten, with 7-12 small acute spines. Metatibia with inner ventral carina not elevated. Pygidium wider than long (length/width ratio mean 0.89).

Differential Diagnosis.—See COMPARISONS OF SPECIES IN CARYOBRUCHUS.

Males.—*Integument.* Hirsute, base of each seta in a minute puncture (therefore minutely punctulate where setae have been removed). Gula, ventral part of gena, apical end of proepimeron (with golden setae lining the margin), metacoxa near trochanter, and part of mesal side of metafemur glabrous. *Color.* Body and appendages uniform dark brown, sometimes slightly reddish.

Vestiture. Setae often lost on part of the body, possibly due to rubbing. Dorsal and ventral body surfaces with yellowish-white, medium texture, recumbent, moderately dense, uniform setae; antenna with minute white setae; sparse setae on elytron; sparse setae on ventral ridge of metafemur not covering the pecten: protibia and mesotibia with coarse, golden, moderately dense to dense setae apically; metatibia lacking golden setae except a few golden setae inside apex of mucro; tarsomere 1 with moderately dense, golden setae, ventral side of tarsomere 3 with very dense, coarse, golden setae; pygidium not as densely hirsute as elytron.

Head. Longer or as long as pronotum; frons and vertex with median glabrous carina, carina at vertex not interrupted by a weak depression (Fig. 96); ocular sinus vague or lacking; on dorsal side eyes approximate; postocular lobe medium length; antenna shorter than elytron, segments 4-10 serrate, longer than wide; maxillary palp segment 3 twice as long or longer than segment 2, and elongate; gena long; sides of submentum only feebly converging triangularly between eyes; on ventral side eyes distant.

Prothorax. Disk wider than long (length/width ratio mean 0.68); moderately punctate; all sides with strong, impressed, marginal line, anterior margin feebly emarginate; angles produced, visible in dorsal view; medial dorsal surface usually flattened, sides depressed, sharply depressed toward apex, angulate, narrowed to apex from slightly more than middle of side; angles of lateral margin at base sharply produced, angle more than 90°; posterior margin arcuate, feebly produced medially; strong lateral prothoracic carina complete, extending from head to elytron. Protarsus 1 shorter, but only slightly wider than metatarsus 1 (sexual dimorphism: not wider in females). Prosternum completely separating procoxae, apex of prosternal process of medium width.

Mesothorax and Metathorax. Scutellum small, subquadrate, often slightly longer than wide. Elytron with dorsal surface usually slightly flattened between humerus and mesal margin, depressed towards sides and apex; humerus nonscabrous; striae punctate. Metafemur incrassate, maximum width closer to base, constricted toward apex, almost twice as long as wide (length/width ratio mean 1.90), ventral side with a pecten armed with 8-13 denticles, produced, short, straight; denticle 1 large, acuminate, closer to femoral apex than to base; following denticles decreasing in size; when leg flexed, tibia positioned on lateral side of pecten; prepectenal ridge longer than pecten, with 7-12 small acute spines;. Metatibia evenly arcuate (angle >90°); three strong ventral carinae, inner carina strong at base and mucro and moderately deep tibial furrow between inner and middle carinae, middle carina strong at base (weak at mucro in some specimens) and fusing with outer carina just before mucro, outer carina strong at base and mucro; lateral, dorsolateral, mesal, and dorsomesal carinae obsolete; mucro medium size; tibial corona smooth, without spines; spur only slightly visible in lateral view. Mesotarsus 1 shorter, but not wider than metatarsus 1. Mesosternal process vaguely slanting, projecting to less than 90° angle from body plane, apex straight or feebly curved back towards plane of metasternum; metaspinasternum only feebly produced.

Abdomen. Sternum 1 about as long as remaining sterna. Pygidium punctulate, moderately convex in lateral view, wider than long (length/width ratio mean 0.89), wider at base than apex, at almost 90° angle to elytron, usually hidden by elytra and thus not visible in dorsal view.

Genitalia. Median lobe (Fig. 152) broad. Ventral valve long with sides forming a triangle with an obtuse angle. Armature of internal sac closely resembling that of *C. gleditsiae*, with two large, median, Y-shaped sclerites, branched slightly above base at about right angle, with one arm acute at apex and hooked; two long, narrow, straight basal serrated sclerites. Lateral lobes (Fig. 153) confluent, not separated, without cleft, apex with vague median notch, fold-like sinus extending from notch to 0.5 length of distance apex to Kingsolver's band.

Females.— Similar to males, maximum thoracic depth usually slightly larger; protarsus 1 not as wide (sexual dimorphism). Armature of bursa copulatrix of two types (Fig. 151): two apposed ventral sclerites, slightly separated at base, sickle-shaped and slightly wider at apex; one dorsal sclerite, very long, narrow, rodlike, slightly wider at apex, base of sac sharply bent (approximately 135° angle) back toward ovipositor, not swollen and bulblike.

Specific Records.—(See list of paratypes). Host records are from collection labels, spelled exactly as written, and should be verified.

Caryobruchus rubidus (Chevrolat)

Figs. 4, 65, 80, 94, 154 - 156

Caryoborus rubidus Chevrolat 1877:114.
Pachymerus rubidus: Pic 1913:8.
Caryobruchus rubidus : Bridwell 1929:155; Udayagiri and Wadhi 1989:240.

Type Data.—Type locality: Mexico, Tutla (probably Tuxtla as in Tuxtla Gutierrez, Chiapas). Holotype male; Mexico, Tutla, D. Boucard, Coll. Chevr.; deposited in Naturhistoriska Riksmuseet, Stockholm (NR). No paratypes.

Distribution.— (Fig. 4).—Specimens examined, 4. Mexico (Chiapas).

Diagnosis.— Integument light to dark reddish-brown, medium texture, white pubescence, partly cover integument color. Males 6.6-7.1 mm, females 6.7-7.3 mm in length (pronotum-elytra); width of males 3.8-3.9 mm, females 3.8-4.0 mm, maximum thoracic depth of males 2.3-2.5 mm, females 2.7-2.9 mm. Eyes distant. Antennal segments 4-10 serrate, segments longer than wide. Disk of pronotum wider than long (length/width ratio mean 0.72). Metafemur about twice as long as wide (length/width ratio mean 1.91); pecten short with 8-11 denticles, denticle 1 acuminate and longer; prepectenal ridge longer than pecten, with 7-9 small usually acute spines. Metatibia with inner ventral carina not elevated. Pygidium wider than long (length/width ratio mean 0.70).

Males.—Integument. Hirsute, base of each seta in a minute puncture (therefore minutely punctulate where setae have been removed). Gula, ventral part of gena, apical end of proepimeron (with white setae lining the margin), metacoxa near trochanter, and part of mesal side of metafemur glabrous. *Color.* Body and appendages uniform light to dark reddish-brown.

Vestiture. Setae often lost on part of the body, possibly due to rubbing. Dorsal and ventral body surfaces with white, medium texture, recumbent, moderately dense, uniform setae; antenna with minute white setae, and longer golden sparsely irregular setae; elytron moderately hirsute; sparse setae on ventral ridge of metafemur not covering pecten; protibia and mesotibia with coarse, golden, moderately dense to dense setae apically; metatibia lacking golden setae except a few golden setae inside apex of mucro; tarsomere 1 with moderately dense, golden setae, ventral side of tarsomere 3 with very dense, coarse, golden setae; pygidium about as densely hirsute as elytron, setae longer.

Head. About as long as pronotum; frons and vertex with weak median glabrous carina, carina at vertex not interrupted by a weak depression (Fig. 96); ocular sinus vague; on dorsal side eyes distant; postocular lobe medium size; antenna shorter than elytron, segments 4-10 serrate, longer than wide; maxillary palp segment 3 about twice as long as segment 2, widest at middle of segment; gena long; sides of submentum only feebly converging triangularly between eyes; on ventral side eyes distant.

Prothorax. Disk wider than long (length/width ratio mean 0.72); densely punctate, punctations distributed more or less evenly over the disk; all sides with strong, impressed, marginal line, anterior margin clearly emarginate; angles vaguely pointed, visible in dorsal view; medial dorsal surface usually feebly convex sometimes flattened, sides depressed, more depressed toward apex, feebly angulate or arcuate, narrowed to apex from slightly more than middle of side; angles of lateral margin at base sharply produced, angle more than 90°; posterior margin arcuate, produced medially; strong lateral prothoracic carina complete, extending from head to elytron. Protarsus 1 shorter, but only slightly wider than metatarsus 1 (sexual dimorphism: not wider in females). Prosternum completely separating procoxae, apex of prosternal process narrow.

Mesothorax and Metathorax. Scutellum small, subquadrate, often slightly wider than long. Elytron with dorsal surface usually slightly flattened between humerus and mesal margin, depressed towards sides and apex; humerus scabrous (usually covered by setae); striae punctate. Metafemur incrassate, maximum width slightly closer to base, constricted toward apex, almost twice as long as wide (length/width ratio mean 1.91), ventral side with a pecten armed with 8-11 denticles, produced, short, straight; denticle 1 large, acuminate, closer to femoral apex than to base; following denticles smaller and decreasing in size; when leg flexed tibia positioned on lateral side of pecten; prepectenal ridge longer than pecten, with 7-9 small, usually acute spines. Metatibia evenly arcuate (angle >90°), dorsal side partly granulate (covered by setae); three strong ventral carinae, inner carina very strong, wide tibial furrow between inner and middle carinae, middle carina very strong, very close to and fusing with outer carina at mucro, outer carina very strong; lateral, dorsolateral, mesal, and dorsomesal carinae obsolete; mucro medium size; tibial corona smooth, without spines; spur clearly visible in lateral view, sparsely covered with setae. Mesotarsus 1 shorter, but not wider than metatarsus 1. Mesosternal process slanting, projecting to less than 90° angle from body plane, apex not curved back towards plane of metasternum, metaspinasternum only feebly produced.

Abdomen. Sternum 1 about as long as remaining sterna. Pygidium punctulate, convex in lateral view, wider than long (length/width ratio mean 0.89), wider at base than apex, at more than 90° angle to elytron, elytra usually hidden by elytra, and thus not visible in dorsal view.

Genitalia. Median lobe (Fig. 155) broad. Ventral valve short with sides forming a triangle with an obtuse angle. Armature of internal sac with four median, flattened, cone-shaped sclerites, the two upper sclerites with the produced arms opposing each other, the two lower with the produced arms in the same direction; and two basal sclerites, curved, wide, serrate with marginal denticles. Lateral lobes (Fig. 156) confluent, not separated, without cleft, cutis flat, apex with median notch, vague line-like sinus extending from notch to 0.25 length of distance apex to Kingsolver's band.

Females.— Similar to males, but maximum thoracic depth slightly larger, pygidium sometimes visible in dorsal view. Armature of bursa copulatrix (Fig. 154) of two types: two apposed ventral sclerites, narrowed at middle; one large, long, dorsal sclerite, wider at base; base of sac slightly swollen and bulblike.

Specific Records.— Host records are from collection labels, spelled exactly as written, and should be verified. Mexico: Tutla (probably Tuxtla, as in Tuxtla Gutierrez, Chiapas), D.Boucard, *holotype*, (NR); Morelos, ex *Brahea* palm, quarantine Laredo, (USNM) (Morelos might not be the original collecting area, since border interceptions often do not have information on the collection area, only the locality from where it was shipped).

Discussion.—This species needs to be collected extensively. Only four specimens with poor records were obtained for this study.

Caryobruchus veseyi (Horn)

Figs. 5, 77, 90, 145 - 147

Caryoborus veseyi Horn 1873:313.
Pachymerus veseyi: Pic 1913:9.
Caryobruchus veseyi: Bridwell 1929:157.

Type Data.—Type locality: Baja California, Mexico. Holotype female, LeConte coll.; deposited in Museum of Comparative Zoology, Harvard UniversityMuseum of Comparative Zoology, Cambridge (MCZ). No paratypes. Collector and collection locality not on the pin, but is noted in the original description: J.X. de Vesey, the peninsula of lower California.

Distribution.—Specimen examined, 64. Mexico (Baja California).

Diagnosis.— Integument dark reddish-brown, fine, white pubescence partly covers integument color. Males 8.2-9.3 mm, females 7.6-12.1 mm in length (pronotum-elytra); width of males 4.8-5.2 mm, females 4.2-6.6 mm, maximum thoracic depth of males 2.7-3.3 mm, females 2.4-4.1 mm. Eyes distant. Antennal segments feebly 4-10 serrate, segments markedly longer than wide. Disk of prosternum wider than long (length/width ratio mean 0.78). Metafemur much more than twice as long as wide (length/width ratio mean 2.60); pecten short with 8-11 denticles, denticle 1 acuminate and much longer; prepectenal ridge longer than pecten, with 10-14 small usually acute spines. Metatibia with inner ventral carina not elevated. Pygidium wider than long (length/width ratio mean 0.76).

Males.—Integument. Hirsute, base of each seta in a minute puncture (therefore minutely punctulate where setae have been removed). Gula, ventral part of gena, apical end of proepimeron (with white setae lining the margin), metacoxa near trochanter, and part of mesal side of metafemur glabrous. *Color.* Body and appendages uniform medium to dark reddish-brown.

Vestiture. Setae often lost on parts of the body, possibly due to rubbing. Dorsal and ventral body surfaces with white, fine, very short, recumbent, moderately dense, uniform setae; antenna with minute white setae; elytron moderately hirsute; sparse setae on ventral ridge of metafemur not covering pecten; protibia and mesotibia with coarse, golden, moderately dense to dense setae apically; metatibia lacking golden setae except a few golden setae inside apex of mucro; tarsomere 1 with moderately dense, golden setae, ventral side of tarsomere 3 with very dense, coarse, golden setae; pygidium not as densely hirsute as elytron, setae longer.

Head. Slightly shorter than pronotum; frons and vertex with prominent median glabrous carina, carina at vertex not interrupted by a weak depression (Fig. 96); ocular sinus vague; on dorsal side eyes distant; postocular lobe prominent; antenna shorter than elytra, segment 4 often non-serrate, segments 5-10 feebly serrate or non-serrate, markedly longer than wide; gena long; sides of submentum only feebly converging between eyes; on ventral side eyes distant.

Prothorax. Disk wider than long (length/width ratio mean 0.78); moderately to densely punctate; all sides with strong, impressed, marginal line, anterior margin clearly emarginate; angles vaguely pointed, visible in dorsal view; medial dorsal surface usually convex, sides depressed, more depressed toward apex, arcuate, narrowed to apex from slightly more than middle of side; angles of lateral margin at base produced, angle more than 90°; posterior margin arcuate, not produced or only feebly produced medially; strong lateral prothoracic carina complete, extending from head to elytron. Protarsus 1 shorter, but only slightly wider than metatarsus 1 (sexual dimorphism: not wider in females). Prosternum completely separating procoxae, apex of prosternal process narrow.

Mesothorax and Metathorax. Scutellum small, subquadrate. Elytron with dorsal surface usually slightly flattened between humerus and mesal margin, depressed towards sides and apex; humerus scabrous; striae punctate. Metafemur incrassate (much less so than any other species of *Caryobruchus*), maximum width slightly closer to apex, constricted toward apex, much more than twice as long as wide (length/width ratio mean 2.60), ventral side with a pecten armed with 8-11 denticles, produced; denticle 1 large, acuminate, closer to femoral apex than to base; following denticles smaller and decreasing in size; when leg flexed, tibia positioned on lateral side of pecten; prepectenal ridge longer than pecten, with 10-14 small, usually acute spines; lateral side with small punctures, usually not visible under setae. Metatibia evenly arcuate (angle >90°), dorsal side granulate; three strong ventral carinae, inner carina very strong, wide tibial furrow between inner and middle carinae, middle very carina strong, very close to and fusing with outer carina at mucro, outer carina very strong; lateral, dorsolateral, mesal, and dorsomesal carinae obsolete; mucro short; tibial corona smooth, without spines; spur clearly visible in lateral view, sparsely covered with setae. Mesotarsus 1 shorter, but not wider than metatarsus 1. Mesosternal process slanting, projecting to less than 90° angle from body plane, apex usually not curved back towards plane of metasternum; metaspinasternum only feebly produced.

Abdomen. Sternum 1 about as long as remaining sterna. Pygidium punctulate, feebly convex in lateral view, wider than long (length/width ratio mean 0.76), wider at base than apex, at almost 90° angle to elytron, usually hidden by the elytra and thus not visible in dorsal view.

Genitalia. Median lobe (Fig. 146) slender. Ventral valve long with sides forming a triangle with an angle. Armature of internal sac with two median, Y-shaped sclerites, one arm acute at apex, branch from slightly more than middle of the sclerite at about right angle; four large, basal sclerites, two large, blade-shaped, broad at base, acute at apex, two small, bulbous, denticulated, colorless (the sclerites in Pachymerinae are normally dark brown), with basal end open sclerites. Lateral lobes (Fig. 147) confluent, not separated, without cleft, apex with median notch, line-like sinus extending from notch to 0.7 length of distance apex to Kingsolver's band.

Females.— Similar to males, maximum thoracic depth often slightly larger; pygidium sometimes visible in dorsal view; protarsus 1 not as wide (sexual dimorphism). Armature of bursa copulatrix (Fig. 145) of two types: two ventral, very thin and slender, parallel, sclerites; and one dorsal sclerite, long, rodlike at base, wider at apex, base of sac not swollen and bulblike, small part of base usually bent back towards ovipositor.

Specific Records.—Host records are from collection labels, spelled exactly as written, and should be verified. Mexico: Baja California, (due to insufficient collection labels it could often not be determined if the collection locality was in B. Calif. Norte or B. Calif. Sur.) J.X. de Vesey, *holotype*, (MCZ); El Taste, Beyer (SDNHM) (AMNH) (ANSP); El Taste, 01.VIII, Beyer (USNM); Pozo Largo, Santa Rita drainage, Sierra Victoria, 13.IV.55, ex palm *E. brandegeei*, R.S. Ferris (CAS) (CNC); San Fernando, (SDNHM) (MCZ); Santa Rosa, VIII.(no year), G. Beyer (ANSP); Santa Rosa, VIII.(no year), (COR); Santa Rosa (MCZ); Sierra de La Laguna, ex *Erythea brandegeei* Purpus. Gartenfl., I.1906, J.N. Rose (USNM); Baja California Norte, Catavina, 5.VIII.86, *Erythea armata* S. Wats. on ground, F.C. Baptista (CDJ), Sonora, quarantine Nogales, intercepted 20.IV.1959; quarantine Nogales, ex *Sabal rosei* Becc., (USNM); quarantine from Baja California, Resaca, Los Angeles County, ex *Erythea brandegeei* Purpus. Gartenfl. seeds, 1.XII.1980, (CDFA); quarantine from Mexico, Los Angeles, Los Angeles County, ex *Erythea brandegeei* Purpus. Gartenfl., 271981, (CDFA).

Discussion.—With its long, slender antennal segments and metafemur much longer than wide, this species is easily distinguished from other species in *Caryobruchus*.

COMPARISONS OF SPECIES IN *CARYOBRUCHUS*

Species of this genus are very similar and characters overlap. The best and safest way to separate them by species is to use the male and female genitalia (Figs. 139 - 156). However, certain external characters are useful. The following are very distinctive and cannot be confused: large pecten in *C. marieae*; the elevated ventral carina in *C. marieae*; the slender, almost non-pectinate antennal segments in *C. veseyi*; the much longer than wide metafemur in *C. veseyi*; and the long, slender 3rd maxillary palp segment in *C. maya*. *C. maya* is the only species in *Caryobruchus* with the distance between the eyes on the dorsal side approximate, all other species have the eyes distant. Except for these species, and these characters, all other identifications should be verified by inspecting the male or female genitalia. *Caryobruchus maya* is hard to separate from *C. gleditsiae* by external characters only. *C. maya* has a long slender 3rd maxillary palm segment and the setae on the elytron are yellowish white, while *C. gleditsiae* has a short wide 3rd maxillary palp segment and the setae on the elytron are white. *C. maya* has a very distinct shape of bursa copulatrix and the sclerites are smaller and more slender than *C. gleditsiae* (Fig. 151). The sclerites of the median lobe are very similar to *C. gleditsiae* but the basal sclerites have distinctly larger denticles. For morphometrical comparisons see Table 2, note the longer pygidium of *C. marieae*, and the longer metafemur of *C. veseyi*.

Genus **SPECIOMERUS** Nilsson, **new genus**

Type species: *Caryoborus giganteus* Chevrolat, 1877. Present designation.

This genus is referable to the family Bruchidae, subfamily Pachymerinae Bridwell and tribe Pachymerini Bridwell, where it is intermediate between *Caryoborus* Schönherr and *Caryobruchus* Bridwell. It can be distinguished from these genera by the following characters.

Elongated beetles. Integument varying from light brown to almost black, with reddish and yellowish tint in some species, setae sparse with uniform whitish color, sometimes appear almost non-hirsute. Head short, constricted behind eye; vertex with sharp or diffuse median carina, sometimes partly covered by setae; eye large, bulging, extending to both dorsal and ventral sides of head; ocular sinus almost nonexistent; submentum tapering, posterior part narrow to very narrow, sides parallel, not converging between eye and gena. Antennal segments 4-10 serrate. Pronotum subrectangular, transverse, base and apex about the same width; disk with surrounding impressed marginal line; lateral carina complete, extending from base to apex. Prosternum with long process, completely separating procoxae. Mesosternum with long process, cleft at apex. Elytron elongate, approximately three times longer than wide. Scutellum square, truncate apically. Metafemur incrassate, elongate; dorsal side smooth; ventral side pectinate; pecten produced, straight, with denticles, denticle 1 acuminate, larger than the other denticles, located beyond middle of femur; when leg flexed, tibia positioned on lateral side of pecten; prepectenal ridge with spines, with or without a protuberance. Metatibia arcuate; three strong ventral carinae, middle carina without tubercle and sulcus; lateral and dorsolateral carinae obsolete; mesal and dorsomesal carinae obsolete; mucro at apex, without apical calcaria. Median lobe slender, without median sclerites, with or without large basal sclerites. Lateral lobes confluent, not separated, with small cleft, apex with vague, median notch and a fine line- or fold-like sinus (Figs. 129, 132, 135, 138); without gemmae; Kingsolver's band present.

Speciomerus is best separated from the other three genera in Pachymerini by studying the genitalia. *Pachymerus*, except *P. cardo*, has gemmae, *Caryobruchus* has median sclerites, and *Caryoborus* has lateral lobes partly surrounding the apex on the dorsal and lateral sides of the median lobe. *Speciomerus* lacks these structures. With external characters *Pachymerus* is best separated from the other genera in Pachymerini by the position of the metatibia on the lateral side of the pecten when the leg is flexed (Fig. 23). *Caryoborus*, *Caryobruchus* and *Speciomerus* have the leg on the mesal side of the pecten when flexed (Fig.23). The apical calcaria ventrad to the mucro on the metatibia (Fig. 70) separate *Caryoborus* from *Caryobruchus* and *Speciomerus* which lack these structures. *Speciomerus* is best separated from *Caryobruchus* by the shape of the submentum: in *Speciomerus* the sides of the submentum are parallel or nearly so (Fig. 61); in *Caryobruchus* the sides of the submentum are strongly converging triangularly (Fig. 56). Taxonomically important length/width ratio means are in Table 2.

The following four species of *Speciomerus* are considered valid: *S. giganteus* (Chevrolat), new combination; *S. revoili* (Pic), new combination; *S. rubrofemoralis* (Pic), new combination; and *S. ruficornis* (Germar), new combination.

KEY TO SPECIES OF *SPECIOMERUS*

1 Color of metafemur usually reddish brown to almost orange, distinctly different from dark elytron (epipleuron often same color as metafemur); color of elytron usually black with very fine white very vague setae (hard to see, may appear to be without setae); median lobe without sclerites (Fig. 134); female genitalia with three pairs of sclerites (Fig. 133) .... *S. rubrofemoralis* (Pic)

— Color of metafemur variable but more or less same color as the elytra (epipleuron always same color as rest of elytron); color of elytron variable with clearly apparent white setae; median lobe with sclerites (Figs. 128, 131, 137); female genitalia with two pairs of sclerites 2

2 (1) When leg flexed, prepectenal ridge with small or very small spines without protuberance or only feebly so (Figs. 73, 74); frons and vertex with medium median partly glabrous carina, carina continuous not interrupted by weak depression; color of integument usually dark brown or black .... *S. revoili* (Pic)

— When leg flexed, prepectenal ridge with large spines with a cristate protuberance positioned on lateral side of metatibia (Figs. 71, 72); frons and vertex with medium median partly glabrous carina, carina interrupted by weak depression (Fig. 96); color of integument usually light brown or yellowish brown 3

3 (2) Color of elytra variable with setae always forming longitudinal stripes (less apparent under the microscope); body elongate, wide; last maxillary palp slightly widened; apodeme of spiculum gastrale in female genitalia of normal length (Fig. 130) .... *S. ruficornis* (Germar)

— Color of elytra variable with setae never forming longitudinal stripes; body elongate, narrow; last maxillary palp narrow; apodeme of spiculum gastrale in female genitalia very long (Fig. 127) .... *S. giganteus* (Chevrolat)

Speciomerus giganteus (Chevrolat), **new combination**

Figs. 2, 15, 34, 61, 71, 96, 127 - 129

Caryoborus giganteus Chevrolat 1877:98.
Pachymerus giganteus: Pic 1913:7.
Caryobruchus giganteus Bridwell 1929:155; Udayagiri and Wadhi 1989:239.
Caryoborus donckieri Pic 1899:21. **New synonymy.**
Caryobruchus scheeleae Bridwell 1929:151. **New synonymy.**
Caryobruchus lipasmatus Bridwell 1929:152. **New synonymy.**
Caryobruchus buscki Bridwell 1929:152. **New synonymy.**
Caryobruchus pararius Bridwell 1929:153. **New synonymy.**

Type Data.—Type locality: Bahia, Brazil. Holotype female, Bahia, D. Mocquerys, prise vivante à Rouen, col. Chevrol.; deposited in Naturhistoriska Riksmuseet, Stockholm, (NR). No allotype and no other paratypes. *Caryoborus donckieri*. Jatahy, Prov. Goyas, Bresil, Sept. á Nov. 97; deposited in the Muséum National d'Histoire Naturelle, Paris (MNHP). *Caryobruchus buscki*: Panama, Canal Zone, Tabernilla, A. Busck; deposited in the U.S. National Museum, Washington, D.C. (USNM). *Caryobruchus lipasmatus* Brazil, Pará, reared from Babassu nut, quarantine New York; deposited in USNM. *Caryobruchus pararius*: Brazil, Pará, 19.IV.1919, ex nuts, quarantine Washington, D.C.; deposited in USNM. *Caryobruchus scheeleae*: Colombia, Bolivar, El Banco, ex *Attalea*, unknown quarantine; deposited in USNM.

Distribution .—(Fig. 2). Specimens examined, 132. Bolivia, Brazil (Amazonas, Bahia, Matto Grosso, Pará, Paraíba, Rio de Janeiro, Rondonia, Santa Catarina, São Paulo), Colombia (Bolivar, Meta), Costa Rica, Guayana, Panama, Peru, Venezuela (Barinas, Bolivar).

Diagnosis.— Integument medium to dark reddish-brown, leg 1 and 2 lighter contrasting color (especially in specimens with dark elytra), tibia and tarsus yellowish-brown, antennae yellowish brown, fine yellowish-white pubescence partly cover integument color. Males 12.0-17.1 mm, females 12.2-21.2 mm in length (pronotum-elytra); width of males 5.6-7.0 mm, females 4.8-8.6 mm, maximum thoracic depth of males 4.6-6.4 mm, females 4.6-8.4 mm. Eyes approximate. Antennal segments 4-10 feebly serrate, segments markedly longer than wide, segment 9 about as long as segment 4 but segment 4 usually wider. Disk of pronotum wider than long (length/width ratio mean 0.84). Metafemur more than twice as long as wide (length/width ratio mean 2.13); pecten short with 10-17 denticles, denticle 1 acuminate and longer; prepectenal ridge longer than pecten, with 4-7 large acute or edged spines. Metatibia with inner ventral carina slightly elevated. Pygidium usually as long as wide or longer than long (length/width ratio mean 1.02).

Males.—Integument. Hirsute, base of each seta in a minute puncture (therefore minutely punctulate where setae have been removed). Gula, ventral part of gena, apical end of proepimeron (with golden setae lining the margin), metacoxa near trochanter, and part of mesal side of metafemur glabrous. *Color.* Body and appendages uniform dark reddish-brown, leg 1 and 2 usually light reddish-brown to almost yellow, tibia and tarsus usually yellowish-brown to almost yellow, antennae yellowish brown to almost yellow.

Vestiture. Setae often lost on part of body, possibly due to rubbing. Dorsal and ventral body surfaces with white or yellowish-white, fine, recumbent, dense, uniform setae; antenna with minute yellowish-white setae; elytron surface sparsely hirsute; protibia and mesotibia with coarse, golden, moderately dense to dense setae apically; metatibia lacking golden setae except a few golden setae inside apex of mucro; ventral ridge of metafemur with sparse setae not covering pecten; tarsomeres on all legs with moderately dense, golden setae, ventral side of tarsomere 3 with very dense, coarse, golden setae; pygidium not as densely hirsute as elytron.

Head. Slightly shorter than pronotum; frons and vertex with week to strong median glabrous carina, carina at vertex interrupted by a week depression (Fig. 96); ocular sinus short but distinct; on dorsal side eyes approximate; postocular lobe very short, with a weak glabrous carina continuing on gena; antenna often only slightly shorter than elytra, segments 4-10 serrate, markedly longer than wide, segment 9 about as long as segment 4, but segment 4 usually wider; gena short; sides of submentum parallel, not converging triangularly between eyes; on ventral side eyes approximate.

Prothorax. Disk wider than long (length/width ratio mean 0.84); all sides with strong, impressed, marginal line, anterior margin straight or feebly emarginate; angles pointed, visible in dorsal view; medially dorsal surface flattened, more flattened posteriorly; sparsely punctate, punctations unevenly distributed as four clusters, often with weak but distinct sulci towards sides; sides depressed, more depressed toward apex, usually strongly angulate, narrowed to apex from slightly more than middle of side; angles of lateral margin at base sharply produced, angle more than or about 90°; posterior margin arcuate, produced medially; strong lateral prothoracic carina complete, extending from base to apex. Protarsus 1 swollen, shorter and wider than metatarsus 1 (sexual dimorphism: not wider in females). Prosternum completely separating procoxae, apex of prosternal process medium width, sometimes wide.

Mesothorax and Metathorax. Scutellum small, subquadrate. Elytron with dorsal surface flattened or feebly convex between humerus and mesal margin, depressed laterally and apically; humerus usually non-scabrous, but some specimens feebly scabrous, scabrosites often covered by setae; striae punctate. Metafemur incrassate, maximum width slightly closer to base, constricted toward apex, more than twice as long as wide (length/width ratio mean 2.13) ventral side with a pecten armed with 10-17 denticles, produced, short, straight; denticle 1 large, acuminate, closer to femoral apex than to base; following denticles smaller and decreasing in size; when leg flexed, tibia positioned on lateral side of pecten; prepectenal ridge longer than pecten, with 4-7 large acute or edged spines; lateral side without visible small punctures. Metatibia evenly arcuate (angle >90°); three strong ventral carinae; inner carina very strong and slightly elevated from before middle, wide tibial furrow between inner and middle carinae; middle carina very strong, very close to and fusing with outer carina before mucro; outer carina medium strength, slightly weaker before fusing with middle carinae; lateral, dorsolateral, mesal, and dorsomesal carinae obsolete; mucro long; tibial corona smooth, without spines; spur visible in lateral view. Mesotarsus 1, slightly swollen, shorter and wider than metatarsus 1. Mesosternal process with cleft, usually not slanting, produced, projecting to 90° angle from body plane, apex sharply bent back towards plane of metasternum; metaspinasternum feebly produced.

Abdomen. Sternum 1 about as long as remaining sterna. Pygidium punctulate, feebly convex in lateral view, usually as long as wide or longer than wide (length/width ratio mean 1.02), wider at base than apex, only partly hidden by the elytra, elytra cover 0-40% of pygidium length from base, at much more than 90° angle to elytron, thus visible in dorsal view.

Genitalia. Median lobe (Fig. 128) slender. Ventral valve long with sides forming a triangle with an acute angle. Armature of internal sac without median sclerites; with a transparent, almost colorless, small, median structure, without a cleft but with numerous small denticles; and with two very long, slender, basal sclerites, with small denticles at both apical and basal ends. Lateral lobes (Fig. 129) confluent, not separated; Kingsolver's band present.

Females.— Similar to males, maximum thoracic depth slightly larger. Sexual dimorphism; pro- and mesotarsus 1 slightly wider than metatarsus 1, but not swollen as in males, pygidium almost straight in lateral view. Armature of bursa copulatrix (Fig. 127); one pair of ventral sclerites; one dorsal sclerite. Apodeme of spiculum gastrale longer than normal.

Specific Records.—Only records with host plant associations included. Host records are from collection labels, spelled exactly as written, and should be verified. Brazil: Pará, Carajas, em semente de Babacu, 24.VII.1987, M.V. de Macedo (UFDP); Pará, reared from Babassu nut, quarantine New York, *holotype, Caryobruchus lipasmatus* (USNM); Pará, reared from Babassu nut, quarantine New York, *allotype, Caryobruchus lipasmatus* (USNM); Pará, 19.IV.1919, ex nuts, quarantine Washington, D.C., *holotype, Caryobruchus pararius* (USNM). Colombia: Bolivar, El Banco, ex *Attalea*, unknown quarantine, *holotype, Caryobruchus scheeleae* (USNM); Bolivar, El Banco, ex *Attalea*, 24.VI.1916, unknown quarantine, *paratype, Caryobruchus scheeleae* (USNM). Costa Rica: Puntarenas, 10.2 mi N. Puntarenas, 15.II.1970, reared from *Scheelea liebmannii* Becc. (USNM). Panama: Canal Zone, Barro Colorado Island, ex *Scheelea zonensis* L.H. Bailey (=Corozo Palm), 27.VI.1933, J.D. & H. Hood (USNM); Canal Zone, Barro Colorado Island, seed *Scheelea zonensis* L.H. Bailey , III.1981, J. Wright (JAN); Canal Zone, Barro Colorado Island, Roosevelt Rdg. 197, 2.VI.1983 (USNM); II. no year, ex *Scheelea zonensis* L.H. Bailey , quarantine Washington, D.C. (USNM). Venezuela: Barinas, W. of Brainas, ex seed of *Scheelea rostrata* Burret, late.II.1974, 21.X.1973, D.H. Janzen (USNM); Cascaras, ex *Scheelea macrolepis* Burret, 181948, D.W. Jenkins (USNM); reared from seeds of *Englerophoenix* sp., quarantine New York, 10.VI.1937 (USNM).

Discussion.—This is the largest species of palm bruchid. Bridwell (1929) described four new species of *Caryobruchus*, but they are all conspecific with *C. giganteus*. He studied very few specimens (only one or two of each new species), did not study types, and used color and punctuation on the disk of the pronotum to separate species. These characters are highly variable within this species.

Speciomerus revoili (Pic), **new combination**

Figs. 2, 14, 73, 136, 138

Caryoborus revoili Pic 1902:172.
Pachymerus revoili: Pic 1913:8.
Caryobruchus revoili: Bridwell 1929:155; Udayagiri and Wadhi 1989:240.
Caryobruchus acrocomiae Bridwell 1929:153; Udayagiri and Wadhi 1989:238. **New synonymy.**

Type Data.—Type locality: Paraguay. Holotype female, Revoil; deposited in Muséum National d'Histoire Naturelle, Paris (MNHP). The type is badly insect damaged, a homotype was therefore deposited in MNHP together with the type. No allotype and no other paratypes. *Caryoborus acrocomiae*: Holotype, Uruguay, ex seed *Acrocomia* sp., quarantine Washington , D.C., 9.XII.1921; deposited in the U.S. National Museum, Washington, D.C. (USNM).

Distribution.— (Fig. 2). Specimens examined, 52. Argentina (Salta, Misiones), Bolivia (Santa Cruz), Brazil (Mato Grosso, Mato Grosso del Sul, Rio Grande do Sul), Paraguay (Alto Paraná, Cordillera, Paraguarí, San Pedro), Uruguay, Venezuela (Apure, Guarico, Barinas).

Diagnosis.— Integument dark reddish-brown, to almost black, some specimens more red than others, appendages and antennae with slightly lighter, more yellowish color, hind femur often with a darker area in the center, fine white to yellowish-white pubescence partly covers integument color. Males 10.3-17.2 mm, females 10.7-16.8 mm in length (pronotum-elytra); width of males 5.6-9.4 mm, females 6.0-8.8 mm, maximum thoracic depth of males 3.8-6.8 mm, females 4.1-7.0 mm. Eyes approximate. Antennal segments 4-10 feebly serrate, segments longer than wide, segment 9 usually longer than segment 4. Disk of pronotum wider than long (length/width ratio mean 0.74). Metafemur usually twice as long as wide (length/width ratio mean 2.05); pecten short with 8-13 denticles, denticle 1 acuminate and longer; prepectenal ridge longer than pecten, with 4-9 usually large acute or edged spines. Metatibia with inner ventral carina not elevated. Pygidium wider than long (length/width ratio mean 0.79).

Males.—Integument. Hirsute, base of each seta in a minute puncture (therefore minutely punctulate where setae have been removed). Gula, ventral part of gena, apical end of proepimeron (with white setae lining the margin), metacoxa near trochanter, and part of mesal side of metafemur glabrous. *Color*. Body dark reddish-brown, to almost black, some specimens more red than others, appendages and antennae usually with slightly lighter color, hind femur often with darker area in the center.

Vestiture. Setae often lost on parts of the body, possible due to rubbing. Dorsal and ventral body surfaces with white to yellowish-white, fine (very fine on elytra), recumbent, dense, setae; antenna with minute yellowish-white setae; elytron surface densely hirsute; protibia and mesotibia with coarse, golden, moderately dense to dense setae apically; metatibia lacking golden setae except a few golden setae inside apex of mucro; ventral ridge of metafemur with sparse setae not covering pecten; tarsomere 1 with moderately dense, golden setae, ventral side of tarsomere 2 with a few coarse, golden setae, ventral side of tarsomere 3 with very dense, coarse, golden setae; pygidium not as densely hirsute as elytron, setae longer and coarser.

Head. Slightly shorter than pronotum; frons and vertex with weak to strong median usually glabrous but sometimes hirsute carina at vertex not interrupted by a weak depression (Fig. 96); ocular sinus vague; on dorsal side eyes approximate; postocular lobe short, with a glabrous carina continuing on gena; antenna clearly shorter than elytra, segments 4-10 serrated, longer than wide, segment 9 usually longer than segment 4, both segments about the same width, or segment 4 slightly wider; gena short; sides of submentum parallel, not converging triangularly between eyes; on ventral side eyes approximate.

Prothorax. Disk wider than long (length/width ratio mean 0.74); all sides with strong, impressed, marginal line, anterior margin emarginate; angles vaguely pointed, visible in dorsal view; medial dorsal surface flattened to convex, punctate, small punctations (different from the punctations due to loss of setae) evenly distributed over the disk, large punctae unevenly distributed as four clusters; sides depressed, more depressed toward apex, angulate, narrowed to apex from slightly more than middle of side; angles of lateral margin at base produced, angle more than 90°; posterior margin arcuate, produced medially; strong lateral prothoracic carina complete, extending from base to apex. Protarsus 1 shorter and not very wide or swollen but wider than metatarsus 1 (sexual dimorphism: not wider in females). Prosternum completely separating procoxae, apex of prosternal process narrow or medium width.

Mesothorax and Metathorax. Scutellum small, subquadrate. Elytron with dorsal surface flattened, or sometimes feebly convex, between humerus and mesal margin, depressed laterally and apically; humerus non-scabrous, usually without setae; striae punctate. Metafemur incrassate, maximum width slightly closer to base, constricted toward apex, usually more than twice as long as wide (length/width ratio mean 2.05), ventral side with a pecten armed with 8-13 denticles, produced, short, straight; denticle 1 large, acuminate, closer to femoral apex than to base; following denticles smaller and decreasing in size; when leg flexed, tibia positioned on lateral side of pecten; prepectenal ridge longer than pecten, with 4-9 usually large acute or edged spines; lateral side with visible small punctures, feebly visible under setae. Metatibia evenly arcuate (angle >90°); three strong ventral carinae, inner carina very strong usually not elevated, wide tibial furrow between inner and middle carinae, middle carina very strong, very close to and fusing with outer carina before mucro, outer carina medium strength, slightly weaker before fusing with middle carinae; lateral, dorsolateral, mesal, and dorsomesal carinae obsolete; mucro long; tibial corona smooth, without spines; spur visible in lateral view, sparsely covered with setae. Mesotarsus 1 shorter, not very wide or swollen but wider than metatarsus 1. Mesosternal process often with a cleft at apex, slanting, projecting to much less than 90° angle from body plane, apex gradually or sharply curved back towards plane of metasternum; metaspinasternum not or only feebly produced.

Abdomen. Sternum 1 about as long as remaining sterna. Pygidium punctulate, convex in lateral view, wider than long (length/width ratio mean 0.79), wider at base than apex, partly hidden by the elytra, elytra cover 30-60% of pygidium length from base, at almost 90° angle to elytron, usually not visible in dorsal view.

Genitalia. Median lobe (Fig. 137) slender. Ventral valve long with sides forming a triangle with an acute angle. Armature of internal sac without median sclerites; with a transparent, almost colorless, small, median structure, with a cleft and numerous small denticles; and with two very long, slender, basal sclerites, with small denticles at basal end (often hard to see). Lateral lobes (Fig. 138) confluent, not separated, but with large (for the genus) cleft, apex at about the same level as cutis, with vague median notch, vague fold-like sinus extending from notch to 0.5 length of distance apex to Kingsolver's band.

Females.— Similar to males, but maximum thoracic depth slightly larger. Armature of bursa copulatrix (Fig. 136); one pair of ventral sclerites; one dorsal sclerite. Apodeme of spiculum gastrale normal length.

Specific Records.—Host records are from collection labels, spelled exactly as written, and should be verified. Argentina: Salta, C. Bruch (BR); Misiones, San Ignacio, B. & W. Bade (BR). Bolivia: Santa Cruz, Prov. Andréz Ibáñez, Sta. Cruz, Los Olives, 27.II.1989, P. Bettela (FMNH); Santa Cruz, Prov. Andréz Ibáñez, 6km S de SC, 10.XII.1989, 30.XII.1989, Bettela (FMNH); Santa Cruz, Province del Sara, II.1912, XI.1912, Steinbach (CMNH); Santa Cruz, Prov. del Sara, Buena Vista, alt. 1700 ft., II-IV.1925 (ANSP); Ichilo, Buena Vista, alt. 400 m, X.1962 (MSU); Prov. Ichilo, Buena Vista, 61990, P. Bettella (FMNH). Brazil: Mato Grosso, Diamantino, Facienda Sao Joao, alt. 450 m, 6.II.1981, Ekis & Young (CMNH); Mato Grosso del Sul, Corumba, Serra de Urucum, 25.XI.1960, K. Lenko (USNM); Rio Grande do Sul, Chapada (CMNH). Paraguay: Alto Paraná, Primavera, 17.VIII.1955, E.J. Phillips (BMNH); Cordillera, Emboscada, 15.X.1954 (CNC); Paraguarí, Sapucay, 1903, W. Foster (BMNH); San Pedro, Carumbe, 10-10.II.1973, R. Goldbach (FML); Revoil, *holotype* (MHNP); in *Acrocomia totai* Mart., 1951 (USNM). Uruguay: ex seed *Acrocomia* sp., quarantine Washington , D.C., 9.XII.1921, *holotype*, and 1 *paratype* of *Caryobruchus acrocomiae* (USNM). Venezuela: Apure, Madre Viejo, Rio Apure, en barbas de palma, 21.II.1979, J. Pulido (UCV); Guarico, 59 km E. of Santa Maria de Ipire, from seeds of palm, 15.III.1989 (emerged 30.III.1989), C.D. Johnson (CDJ); Barinas, 25 km S. of Barinas, from seed of palm, 19.III.1989, C.D. Johnson (CDJ).

Discussion.—This species needs to be sampled much more extensively to give a better picture of the geographical distribution. The area of distribution is now divided into two widely separated geographical locations. The color of this species is highly variable, probably depending on host plants, time of killing after emerging from palm fruits, and kind of museum storage. Specimens in the type series of *Caryobruchus acrocomiae* are much more red than any of the other specimens studied. The paratype is almost orange, but with a slightly swollen abdomen, a typical characteristic of teneral beetles. Pachymerine and other bruchids are often also much lighter in color just after they have emerged from seeds. Several parts on the paratype are deformed indicating damage before hardening of the integument. The setae on the elytra are very fine on some specimens, giving them an appearance of having no setae.

This species and *Caryobruchus gleditsiae* are the most variable species in size of the Pachymerini. Changes in size do not seem to be accompanied with any important allometric changes (the small individuals look like the large individuals). Some specimens appear slightly wider, and dorso-ventrally more flattened, but intermediates exist. This is partly an illusion depending on how the elytra are positioned (resting position), and depending on if the pronotum disk is flat or convex. This variation is usually accompanied with a slightly wider pronotal disk. However, the width and shape of the disk is highly variable in all species of Pachymerini.

Speciomerus rubrofemoralis (Pic), **new combination**

Figs. 2, 74, 133 - 135

Caryoborus rubrofemoralis Pic 1899:21.
Pachymerus rubrofemoratus: Pic 1913:8.
Caryobruchus rubrofemoralis: Prevett 1966b:181; Udayagiri and Wadhi 1989:240.

Type Data.—Type locality: Jatahy, Prov. Goyas, Brasil. Holotype, Goias, Jatahy, IX-XI.1897; deposited in Muséum National d'Histoire Naturelle, Paris (MNHP). No paratypes.

Distribution .—(Fig. 2).—Specimens examined, 8. Brazil (Mato Grosso, Goias).

Diagnosis.— Elytra and pronotum very dark reddish-brown to black in some specimens, antennae black, coxa, trochanter and femur on all legs, light reddish brown, metafemur almost orange in some specimens, with center often darker, appear almost non-pubescence with very fine, minute, irregular, white setae. Males 9.8-10.8 mm, females 9.7-11.9 mm in length (pronotum-elytra); width of males 5.6-5.8 mm, females 5.5-5.8 mm, maximum thoracic depth of males 3.7-4.0 mm, females 3.8-4.3 mm. Distance between eyes intermediate. Antennal segments 4-10 feebly serrate, segments longer than wide, segment 9 longer than segment 4, but segment 4 wider. Disk of pronotum wider than long (length/width ratio mean 0.80). Metafemur more than twice as long as wide (length/width ratio mean 2.05); pecten short with 8-10 denticles, denticle 1 acuminate and longer; prepectenal ridge longer than pecten, with 5-7 very small, acute or obtuse spines. Metatibia with inner ventral carina not elevated. Pygidium slightly wider than long (length/width ratio mean 0.96).

Males.—Integument. Hirsute, base of each seta in a minute puncture (therefore minutely punctulate where setae have been removed). Gula, ventral part of gena, apical end of proepimeron (with golden setae lining the margin), metacoxa near trochanter, and part of mesal side of metafemur glabrous. *Color.* Elytra and pronotum, vertex and antennae dark reddish-brown to black, head except vertex dark reddish-brown, coxa, trochanter and femur on all legs light reddish brown, metafemur almost orange in some specimens, epipleuron often light reddish-brown.

Vestiture. Appearance almost non-hirsute, setae minute on dorsal side, on ventral side slightly larger and coarser. Dorsal and ventral body surfaces with white, very short, minute (slightly larger and coarser on ventral side), recumbent, sparse, irregular setae; antenna with minute white setae; elytron surface moderately hirsute; protibia and mesotibia with coarse, golden, moderately dense to dense setae apically; metatibia lacking golden setae except a few golden setae inside apex of mucro; ventral ridge of metafemur with sparse setae not covering pecten; tarsomere 1 with moderately dense, golden setae, ventral side of tarsomere 3 with very dense, coarse, golden setae; pygidium as hirsute as elytron, setae same length.

Head. About as long as pronotum; frons and vertex with medium median partly glabrous carina, carina at vertex interrupted by a weak depression (Fig. 96); ocular sinus vague; distance between eyes on dorsal side intermediate; postocular lobe very short, with a glabrous carina continuing on gena; antenna slightly shorter than elytra, segments 4-10 serrate, longer than wide, segment 4 slightly wider than segment 9; gena short; sides of submentum parallel, not converging triangularly between eyes; on ventral side eyes approximate.

Prothorax. Disk wider than long (length/width ratio mean 0.80); all sides with strong, impressed, marginal line, anterior margin feebly emarginate or straight; angles rounded, usually visible in dorsal view; medial dorsal surface usually feebly convex; sparsely punctate, large, but mostly weak punctations, unevenly distributed more or less as four clusters; sides depressed, more depressed toward apex, arcuate, narrowed to apex from slightly more than middle of side; angles of lateral margin at base produced, angle more than 90°; posterior margin arcuate, produced medially; strong lateral prothoracic carina complete, extending from base to apex. Protarsus 1 shorter, swollen, wider than metatarsus 1 (sexual dimorphism: not wider in females). Prosternum completely separating procoxae, apex of prosternal process narrow.

Mesothorax and Metathorax. Scutellum small, subquadrate. Elytron with dorsal surface convex between humerus and mesal margin, depressed laterally and apically; humerus non-scabrous; striae punctate. Metafemur incrassate, maximum width closer to base, constricted toward apex, usually twice as long as wide (length/width ratio mean 2.05), ventral side with a pecten armed with 8-10 denticles, produced, short, straight; denticle 1 slightly larger, acuminate, closer to femoral apex than to base; following denticles smaller and decreasing in size; when leg flexed, tibia positioned on lateral side of pecten; prepectenal ridge much longer than pecten, with 5-7 very small acute or obtuse spines; lateral side with small punctures, clearly visible as femur is almost non-hirsute. Metatibia evenly arcuate (angle >90°); three strong ventral carinae, inner carina very strong, narrow furrow between inner and middle carinae, middle carina very strong, fusing with outer carina at mucro, outer carina very strong; lateral, dorsolateral, mesal, and dorsomesal carinae obsolete; mucro short; tibial corona smooth, without spines; spur clearly visible in lateral view, sparsely covered with setae. Mesotarsus 1 shorter, swollen in appearance, wider than metatarsus 1. Mesosternal process slanting, projecting to much less than 90° angle from body plane, not curved back towards plane of metasternum, or apex only slightly so; metaspinasternum not produced or only feebly so.

Abdomen. Sternum 1 about as long as remaining sterna. Pygidium punctulate, sometimes hard to see under setae, convex in lateral view, only slightly wider than long (length/width ratio mean 0.96), wider at base than apex, partly hidden by the elytra, elytra cover 40-60% of pygidium length from base, at less than 90° angle to elytron, usually visible in dorsal view.

Genitalia. Median lobe (Fig. 134) slender. Ventral valve long with sides forming a triangle with an acute angle. Armature of internal sac without sclerites; with a transparent, almost colorless, small, median structure, without a cleft and without denticles. Lateral lobes (Fig. 135) confluent, not separated, with small cleft, strong protruding fold, apex often above cutis, with weak median notch, vague fold-like sinus extending from notch to 0.5 length of distance apex to Kingsolver's band.

Females.— Similar to males, but maximum thoracic depth slightly larger. Armature of bursa copulatrix (Fig. 133); two pairs of ventral sclerites; one dorsal sclerite. Apodeme of spiculum gastrale normal length.

Specific Records.—Host plants unknown. Brazil: Mato Grosso, Chapada dos Guimaraes, XI.1963, M. Alvarenga (USNM); Mato Grosso, Rondonopolis, XI.1963, M. Alvarenga (USNM); Cent. Brazil, Chapada, alt. 2600 ft., XI.1902, A.Robert (BMNH); Chapada, Chapada Campo, X, (CMNH); Chapada, X, (CMNH); Chapada, XI-XII, (USNM); Goias, Jatahy, *holotype*, IX-XI.1897 (MHNP).

Discussion.—This species needs to be collected extensively. Only eight specimens have been studied, and the host plants are unknown. The collection labels are somewhat unclear. The holotype location on the specimen label is possibly in French (by Pic?), and the few specimens collected more recently are from "Chapada". With the exception of one specimen, they are without state information. It is assumed that Chapada is the same as Chapada dos Guimaraes, Mato Grosso.

Speciomerus ruficornis (Germar), new combination

Figs. 2, 72, 130 - 132

Bruchus ruficornis Germar 1818:5.
Caryobruchus ruficornis: Bridwell 1929:154; Udayagiri and Wadhi 1989:240.
Bruchus curvipes: Germar 1818:463 (nec Latreille 1811).
Pachymerus curvipes: Pic 1913:7 (nec Latreille 1811).
Caryobruchus pergandei Bridwell 1929:151. **New synonymy.**

Type Data.—Type locality: "Westindißchen Inßeln" from the original description. This species is probably endemic to Brazil, but could have been shipped to one of the islands in the West Indies. Holotype; depository unknown, but the original description, in German, is very good and such that there is no question about the identity of this species. No paratypes. *Caryobruchus pergandei*: deposited in the U.S. National Museum of Natural History, Washington, D.C. (USNM)

Distribution .—(Fig. 2).—Specimens examined, 8. Brazil (Amazonas, Pará, Mato Grosso).

Diagnosis.— Integument light or dark reddish-brown to dark brown, antennae and tarsus often distinctly different color than the rest of the body, usually strongly reddish or yellowish brown, medium texture, yellowish-white, in some specimens slightly golden, pubescence almost completely cover integument color. Males 18.3-19.5 mm, females 15.0-18.8 mm in length (pronotum-elytra); width of males 8.4-10.2 mm, females 8.0-9.0 mm, maximum thoracic depth of males 7.3-7.7 mm, females 7.5-7.9 mm. Eyes approximate. Antennal segments 4-10 feebly serrate, segments longer than wide, segment 4 wider than segment 9, segment 9-10 much longer than wide. Disk of pronotum wider than long (length/width ratio mean 0.81). Metafemur more than twice as long as wide (length/width ratio mean 2.08); pecten short with 11-14 denticles, denticle 1 acuminate and longer; prepectenal ridge longer than pecten, with 3-6 usually large acute or edged spines. Metatibia with inner ventral carina slightly elevated, outer ventral carina tapering from about 70% distance from base, not reaching mucro. Pygidium slightly wider than long (length/width ratio mean 0.92).

Males.—*Integument.* Hirsute, base of each seta in a minute puncture (therefore minutely punctulate where setae have been removed). Gula, ventral part of gena, apical end of proepimeron (with white setae lining the margin), metacoxa near trochanter, and part of mesal side of metafemur glabrous. *Color.* Body and appendages uniform light or dark reddish brown to dark brown.

Vestiture. Setae often lost on parts of the body, possibly due to rubbing. Dorsal and ventral body surfaces with white, medium to fine texture, short, recumbent, dense, regular, setae; antenna with minute yellowish-white to golden setae; elytron surface densely hirsute, area between the stria with pubescence of alternating fine and medium textured setae giving an effect of alternating color, making the elytron appear striped; protibia and mesotibia with coarse, golden, moderately dense to dense setae apically; metatibia lacking golden setae except a few golden setae inside apex of mucro; ventral ridge of metafemur with sparse setae not covering pecten; tarsomere 1 with moderately dense, golden setae, ventral side of tarsomere 2 with a few, very dense, coarse, golden setae, ventral side of tarsomere 3 with many very dense, coarse, golden setae; pygidium not as densely hirsute as elytron, setae longer.

Head. Shorter than pronotum; frons and vertex with median hirsute or slightly glabrous carina, carina at vertex interrupted by a weak depression (Fig. 96); ocular sinus vague; on dorsal side eyes approximate; postocular lobe short, with a glabrous carina, continuing on gena; antenna sometimes almost as long as elytron, segments 4-10 serrate, longer than wide, segment 4 wider than segment 9, segments 9-10 much longer than wide; gena short; sides of submentum parallel, not converging triangularly between eyes; on ventral side eyes approximate.

Prothorax. Disk wider than long (length/width ratio mean 0.81); all sides with strong, impressed, marginal line, anterior margin usually feebly emarginate; angles vaguely pointed, visible in dorsal view; medial dorsal surface flattened; sparsely punctate, large punctations unevenly distributed as four clusters, middle clusters located in a shallow sulcus; sides depressed, more depressed toward apex, angulate, narrowed to apex from slightly more than middle of side; angles of lateral margin at base feebly produced to rounded, angle more than 90°; posterior margin arcuate, produced medially; strong lateral prothoracic carina complete, extending from base to apex. Protarsus 1 shorter and often swollen in appearances much wider than metatarsus 1 (sexual dimorphism: not wider in females). Prosternum completely separating procoxae, apex of prosternal process medium width.

Mesothorax and Metathorax. Scutellum small, subquadrate. Elytron with dorsal surface flattened or slightly convex, between humerus and mesal margin, depressed laterally and apically; humerus non-scabrous; striae punctate. Metafemur incrassate, maximum width closer to base, constricted toward apex, more than twice as long as wide (length/width ratio 2.08), ventral side with a pecten armed with 11-14 denticles, produced, short, straight; denticle 1 large, acuminate, closer to femoral apex than to base; following denticles smaller and decreasing in size; when leg flexed, tibia positioned on lateral side of pecten; prepectenal ridge longer than pecten, with 3-6 large acute or edged spines, usually with a protuberance positioned on lateral side of metatibia when leg flexed; lateral side with small punctures, usually feebly visible under setae. Metatibia evenly arcuate (angle >90°); three strong ventral carinae, inner carina very strong, narrow tibial furrow between inner and middle carinae, middle carina very strong, not so strong at mucro, fusing with outer carina before mucro, outer carina very strong at base tapering from about 70% distance from base not reaching mucro; lateral, dorsolateral, mesal, and dorsomesal carinae obsolete; mucro long; tibial corona smooth, without spines; spur clearly visible in lateral view, but usually partly covered with setae. Mesotarsus 1 slightly shorter and often swollen in appearance, much wider than metatarsus 1. Apex of mesosternal process with cleft, not slanting, projecting to approximately 90° angle from body plane, at apex gradually or sharply curved back towards plane of metasternum; metaspinasternum feebly produced.

Abdomen. Sternum 1 about as long as remaining sterna. Pygidium punctulate, convex in lateral view, slightly wider than long (length/width ratio mean 0.92), wider at base than apex, partly hidden by the elytra, elytra cover 50-70% of pygidium length from base, at almost 90° angle to elytron, but usually visible in dorsal view.

Genitalia. Median lobe (Fig. 131) slender. Ventral valve long with sides forming a triangle with an acute angle. Armature of internal sac without median sclerites; with a transparent, almost colorless, median structure, with a cleft and numerous small denticles; and with two very long, slender, basal sclerites, with small denticles at basal end. Lateral lobes (Fig. 132) confluent, not separated, with large (for the genus) cleft, strong produced fold, apex below cutis, without visible median notch, vague fold-like sinus extending to 0.7 length of distance apex to Kingsolver's band.

Females.— Similar to males, but maximum thoracic depth slightly larger. Armature of bursa copulatrix (Fig. 130); one pair of ventral sclerites; one dorsal sclerite. Apodeme of spiculum gastrale normal length.

Specific Records.—Host plants unknown. The type of *Caryobruchus pergandei* is believed to have emerged from a fruit of an *Astrocaryum* palm from Brazil (Bridwell 1929). Intercepted in Europe from palm fruits of *Bactris* sp, "wahrßcheinlich (probably) *Bactris minor*" (Germar 1818a). Bridwell (1929) stated that this host plant identification probably was wrong. Due to confusion of this species with *B. curvipes* (Germar 1818b) this host record is uncertain. Brazil: Amazonas, Rio Tapajos, Caxiricatuba, 37, A.M. Olalla, (USNM); Pará, (BMNH); Pará, Logan (KZ); Mato Grosso, Chapada, Oct.(USNM); Mato Grosso, Chapada, Dec., (USNM); Vera., 55° 36' W., 12° 46' S., X.1973, M. Alvarenga (CDJ); (no data), *holotype Caryobruchus pergandei*, (USNM).

Discussion.—This species needs to be collected extensively. Only eight specimens have been studied . The collection labels are unclear, without information on states. It is assumed here that Chapada is the same as Chapada dos Guimaraes, Mato Grosso.

COMPARISONS OF SPECIES IN *SPECIOMERUS*

This genus is the most diverse in the tribe Pachymerini. *Speciomerus giganteus* and *S. rubrofemoralis* are slender beetles, and the latter can at first glance be confused with a *Caryoborus* sp. The reddish brown to almost orange color on metafemur on *S. rubrofemoralis* is very distinctive and cannot be confused. Note the absence of sclerites in the median lobe in *S. rubrofemoralis*. *Speciomerus ruficornis* and *S. revoili* are wider beetles, and a small specimen of the latter can be confused with a large *Caryobruchus* sp. The longitudinal stripes on the elytra formed by setae on *S. ruficornis* are very distinctive and cannot be confused. For morphometrical comparisons see Table 2, note the wider pygidium of *S. revoili*.

Genus **PACHYMERUS** Thunberg

Pachymerus Thunberg 1805:281.
Pachymeroides Prevett 1966b:81 (not *Pachymeroides* Signoret 1880)
Butiobruchus Prevett 1966b:183. **New synonymy.**

Type species: *Dermestes bactris* Linné 1763. Designation by monotypy.

Elongated beetles. Integument usually dark brown, setae sparse or dense with uniform whitish, yellow or golden color. Head short, constricted behind eye; vertex with sharp or diffuse median carina, sometimes partly covered by setae; eye large, bulging, extending to both dorsal and ventral sides of head; ocular sinus vague; submentum tapering, posterior part wide, subtriangular or sides parallel. Antennal segments 5-10 serrate. Pronotum subrectangular, transverse, base and apex about the same width; disk usually with surrounding impressed marginal line, line sometimes weak or obsolete along anterior margin; lateral carina complete, extending from base to apex. Prosternum with long process (Figs. 46, 47), completely separating procoxae. Mesosternum with long process (Figs. 41, 42), not cleft. Elytron elongate, approximately three times longer than wide. Scutellum square, truncate apically. Metafemur incrassate, oval or feebly elongate (very elongate in male *P. bactris*); dorsal side nongranulate; ventral side pectinate; pecten vaguely produced, long, with denticles, denticle 1 usually acuminate (except *P. bridwelli* where denticle 1 usually is smaller than other denticles), usually slightly larger than other denticles, located before middle of femur; one or two apical tubercles (Figs. 82-88) (sometimes three tubercles in *P. cardo*); when leg flexed, tibia positioned on mesal side of pecten; prepectenal ridge very short, without spines, or protuberance. Metatibia arcuate; two strong ventral carinae (outer ventral carina obsolete or weak, very short), middle carina with tubercle and sulcus; with lateral and dorsolateral carinae; with mesal and dorsomesal carinae; mucro at apex, without apical calcaria. Median lobe slender, with basal hood usually broad, without median and basal sclerites. Lateral lobes confluent, not separated, without cleft, apex with vague median notch and a fine line- or fold-like sinus (Figs. 160, 164, 168, 172, 176, 180, 184); with gemmae (except *P. cardo*); Kingsolver's band absent.

The following seven species of *Pachymerus* are considered valid: *P. abruptestriatus* (Gyllenhal); *P. bactris* (Linné); *P. bridwelli* (Prevett), new combination; *P. cardo* (Fåhraeus); *P. nucleorum* (Fabricius); *P. sveni* Nilsson, new species; and *P. thoracicus* Prevett.

KEY TO SPECIES OF *PACHYMERUS*

1 Male genitalia without gemmae (Fig. 157) .... *P. cardo* (Fåhraeus) (in part)

— Male genitalia with gemmae (Fig. 161), or females of all species 2

2 (1) Metafemur without a large acuminate first pectenal denticle (Fig. 81); metatibia without tibial sulcus (Figs. 24D, 81); sides of submentum between eyes almost parallel .... *P. bridwelli* (Prevett)

— Metafemur with a large acuminate first pectenal denticle (Figs 82-88); metatibia with tibial sulcus (Figs. 24B, 24C); sides of submentum strongly converging triangularly between eyes 3

3 (2) Metafemur with a distinct sinuated carina at basal end (Figs. 25, 27, 84, 88) 4

— Metafemur without a sinuated carina at basal end (Fig. 26) 5

4 (3) Metafemur elongate (males only) (Fig. 25); one apical denticle on metafemur (Figs. 25, 26, 84) .... *P. bactris* (Linné) (in part)

— Metafemur oval (both males and females) (Fig.27, 88); 2 apical tubercles on metafemur (Figs. 27, 88) .... *P. sveni* Nilsson (in part)

5 (3) Three apical tubercles on metafemur .... *P. cardo* (Fåhraeus) (in part)

— One or two apical tubercles on metafemur (Figs. 82 - 88) 6

6 (5) One apical denticle on metafemur (Figs. 82, 84, 87) 7

— Two apical tubercles on metafemur (Figs. 83, 85, 86, 88) 9

7 (6) Eyes approximate (close together) (Fig. 55); pubescence strongly golden, marginal and sutural interval of elytra often with more condensed pubescence appearing paler; hind femur in males elongate (Fig. 84) with sinuated carina, in females incrassate, without sinuated carina (Fig. 82); 3rd maxillary palp segment long and slender (Fig. 55, 60); mesal carina on metatibia extending from apex to only 60% of tibial length .... *P. bactris* (Linné) (in part)

— Eyes distant (far apart) (Fig. 53) or distance between eyes intermediate; pubescence whitish grey or yellow sometimes light golden; marginal and sutural intervals of elytra with uniform pubescence not as above; hind femur in both males and females incrassate, without sinuated carina (Fig. 87, 88); 3rd segment of maxillary palp short and wide (Fig. 53); mesal carina on metatibia extending 100% of tibial length 8

8 (7) Eyes distant (far apart) (Fig. 53); pubescence whitish grey; pecten with a shallow sulcus between last denticle and the other pectenal denticles (Fig. 87B) or a very large fused denticle (Fig. 87A) .... *P. nucleorum* (Fabricius)

— Distance between eyes intermediate; pubescence yellow sometimes light golden; pecten not as above .... *P. cardo* (Fåhraeus) (in part)

9 (6). Eyes distant (far apart) (fig. 53); pronotum disk distinctly wider than long (length/width ratio mean 0.66) .... *P. thoracicus* Prevett

— Eyes approximate (close together) (Fig. 55) or distance between eyes intermediate; pronotum disk wider than long but not as much as above (length/width ratio mean 0.69-0.71) 10

10 (9). Apex of prosternal process blunt, wide (Fig. 47); setae pale yellow, coarse .... *P. abruptestriatus* (Gyllenhal)

— Apex of prosternal process blunt, intermediate width; setae yellow or greyish-white, not coarse 11

11 (10). Metafemur with a sinuated carina at basal end (both males and females) (Fig. 88); setae usually greyish-white .... *P. sveni* Nilsson (in part)

— Metafemur without a sinuated carina at basal end; setae yellow .... *P. cardo* (Fåhraeus) (in part)

Pachymerus abruptestriatus (Gyllenhal)

Figs. 3, 85, 165 - 168

Bruchus abruptestriatus Gyllenhal *in* Schönherr 1839:128.
Pachymerus abruptestriatus: Pic 1913:6; Prevett 1966B:187; Udayagiri and Wadhi 1989:242; Kingsolver and Silva 1991:413.
Caryoborus sparsepunctatus Pic 1902:172; Kingsolver and Silva 1991:413.
Pachymerus diospiros Bondar 1941:387; Prevett 1966B:187; Kingsolver and Silva 1991:413.

Type Data.—Type locality: Brazil. Holotype, Brazil; deposited in Naturhistoriska Riksmuseet, Stockholm (NR). No paratypes. *Caryoborus sparsepunctatus*: Lectotype, Gounelle [?], Brazil [from original description], col. Pic, lectotype *sparsepunctatus* det. Kingsolver 1970; deposited in Muséum National d'Histoire Naturelle, Paris (MNHP). *Pachymerus diospirosi*: Many syntypes (usually with a co-type label) are deposited in the many different collections.

Distribution .—(Fig. 3). Specimens examined, 20. Brazil (Bahia, Minas Gerais).

Diagnosis.— Integument red brown to dark brown, coarse pale yellow pubescence often densely covering integument color.. Males 7.6-10.0 mm, females 7.1-10.5 mm in length (pronotum-elytra); width of males 2.0-5.0 mm, females 1.7-5.4 mm, maximum thoracic depth of males 2.3-3.7 mm, females 2.4-4.1 mm. Antennal segment 4 not serrate, segment 5-10 serrate, about as wide as long. Distance between eyes intermediate. Disk of pronotum wider than long (length/width ratio mean 0.69). Metafemur slightly less than twice as long as wide (length/width ratio mean 1.86); pecten, curved, with 11-16 denticles, denticle 1 acuminate and longer, two apical tubercles, the last usually the largest, the first sometimes larger and partly fused with preceding denticle or with the second small apical denticle; prepectenal ridge shorter than pecten, without spines. Metatibia with two strong ventral carinae, middle ventral carina uniform (not crooked), with a tubercle, outer ventral carina obsolete. Pygidium slightly wider than long (length/width ratio mean 0.74).

Males.—*Integument*. Hirsute, base of each seta in a minute puncture (therefore minutely punctulate where setae have been removed). Gula, part of ventral side of gena, apical end of proepimeron (with golden setae lining the margin), metacoxa near trochanter, and part of mesal side of metafemur glabrous. *Color*. Body usually red brown, head usually dark brown, appendages red brown to yellowish brown.

Vestiture. Setae often lost on parts of the body, possibly due to rubbing. Dorsal and ventral body surfaces with pale yellow, very coarse texture, long, recumbent, dense, uniform setae; antenna with minute yellowish-white, uniform setae; part of ventral side of gena with sparse, fine, yellow setae; elytron surface densely hirsute, protibia and mesotibia with coarse, long, golden, moderately dense to dense setae apically; metatibia lacking golden setae, except a few golden setae inside apex of mucro; ventral ridge of metafemur with pale yellow setae covering pecten; tarsomere 1 with moderately dense, golden setae, ventral side of tarsomere 3 with very dense, coarse, golden setae; pygidium densely hirsute, setae longer than on elytron.

Head. Shorter than pronotum; frons and vertex with a usually prominent median, hirsute, partly glabrous carina, carina at vertex not interrupted by a weak depression (Fig. 96); ocular sinus short; distance between eyes on dorsal side intermediate; postocular lobe short but distinct. Antenna shorter than elytra, antennal segment 4 not serrate, segments 5-10 serrate about as wide as long. Gena long; sides of submentum strongly converging triangularly between the eyes, distance between eyes on ventral side intermediate.

Prothorax. Disk wider than long (length/width ratio mean 0.69); sides and base with strong, impressed, marginal line; anterior margin feebly emarginate, marginal line tapering toward middle, medially line weak or absent (covered by setae); angles vaguely pointed, usually visible in dorsal view; medial dorsal surface flattened, more flattened posteriorly; densely punctate (punctations often hard to see covered by setae); sides depressed, sharply depressed towards apex, usually feebly angulate, narrowed to apex from slightly more than middle of side; angles of lateral margin at base produced, angle 90° or less; posterior margin arcuate, produced medially; strong lateral prothoracic carina complete, extending from base to apex. Protarsus 1 shorter, but only slightly wider than metatarsus 1. Prosternum completely separating procoxae, apex of prosternal process medium to wide.

Mesothorax and Metathorax. Scutellum small, subquadrate. Elytron with dorsal surface feebly convex between humerus and mesal margin, depressed laterally and apically; humerus scabrous, sometimes partly covered with setae; striae punctate. Metafemur incrassate, maximum width closer to base, constricted towards apex, slightly less than twice as long as wide (length/width ratio mean 1.86); ventral side with a pecten, covered with long, coarse, pale yellow setae especially on lateral side, armed with 11-16 denticles; denticle 1 long, acuminate, closer to femoral base than to apex; following denticles smaller in size, covered by setae, the last denticle larger than preceding, feebly tuberculate; two apical tubercles; 2-3 denticles before apical tubercles in a weak sulcus; when leg flexed, tibia positioned on mesal side of pecten; prepectenal ridge much shorter than pecten, covered with setae, without spines; lateral side with small punctures, clearly visible in some specimens as darker spots in between setae. Metatibia evenly arcuate (angle >90°), two very strong ventral carinae, inner carina strong fusing with middle carinae at apex of mucro, middle carina strong, uniform (not crooked), with a tubercle near base, and a short sulcus distal to tubercle, furrow between carinae, outer carina obsolete; lateral carina strong extending 100% of tibia, distance to dorsolateral carina measured at the base of mucro, about the same as if measured from 3/4 length of tibia (75% of distance from base of tibia); dorsolateral carinae medium strength at apex tapering slowly towards base only extending 85% of tibia; mesal carina strong extending 100% of tibia, dorsomesal carinae strong at apex tapering slowly towards base only extending 70% of tibia; all except ventral carinae partly covered by setae (but both lateral and mesal carinae usually clearly visible); mucro long; tibial corona smooth, without spines; spur small barely visible in lateral view, partly covered with setae; mesotarsus 1 shorter, but only slightly wider than metatarsus 1. Mesosternal process produced, projecting to 90° angle from body plane, apex not slanting, not curved back towards plane of metasternum; spinasternum posterior to the process strongly produced.

Abdomen. Sternum 1 about as long as remaining sterna. Pygidium punctulate, convex in lateral view, slightly wider than long (length/width ratio mean 0.74), wider at base than apex, partly hidden by the elytra, elytra cover 20-50% of pygidium length from base, but at more than 90° angle to elytra and usually slightly visible in dorsal view.

Genitalia. Median lobe (Fig. 167). Ventral valve long with sides forming a triangle with an acute angle. Internal sac without armature. Lateral lobes (Fig. 168) confluent, not separated, with gemmae, without cleft, apex with vague median notch and line-like sinus. Kingsolver's band absent.

Females.— Similar to males, but maximum thoracic depth slightly larger. Bursa copulatrix without armature (Fig. 166).

Specific Records.—This is the only species of Pachymerini, "the palm bruchids", that has been reported from a non-palm. The host record is from collection labels and should be verified. Brazil: Bahia, G. Bondar (AMNH); Bahia, Agua Preta, ex seeds of *Diospyros* sp., P. Silva (USNM); Minas Gerais, 1100m, 15.XI.83 (JAN); *holotype*, (NR); Gounelle, *holotype Caryoborus sparsepunctatus* (MNHN).

Pachymerus bactris (Linné)

Figs. 6, 24 - 26, 46, 55, 82, 84, 105 - 107, 173 - 176

Dermestes bactris Linné *in* Jacquin 1763:170; Johansson and Linné 1763:9; Johansson and Linné *in* Schreibers 1841:53.

Bruchus bactris: Linné 1767:605; Fabricius 1792:369; Fåhraeus *in* Schönherr 1839:126.

Dermestes bactridis (sic) Johansson and Linné 1789:392.

Pachymerus bactris: Thunberg 1805:282; Pic 1913:7; Prevett 1966b:182 (neotype designated); Udayagiri and Wadhi 1989:243.

Caryoborus luteomarginatus Chevrolat 1877:106; Prevett 1966:182.

Caryoborus recticollis Chevrolat 1877:115. **New Synonymy.**

Type Data.—Type locality: Carthagenœ [Colombia?; from original description of host palm], collector probably N.J. Jacquin. Holotype, cannot be found, and no paratypes exist. The insect in the collection of Linné in London is not the type (Prevett 1966). The author name for this species has traditionally been Linné (or modifications such as Linnaeus, Linn. or L.). This species is also stated as being originally described by Johansson in 1763, but because of tradition, credit is given to Linné. This is incorrect since the species was first described by Linné alone (*in* Jacquin 1763) in a footnote with *Bactris minor* Jacquin, 1763 (Arecales), collected in Carthagenae. The original type had according to the Johansson's (1763) redescription the label "Americes", no such label exists on the present 'type' in the Linnaean Collection; (slide photo courtesy S.L. Shute, The Natural History Museum, London). Neotype, Venezuela, Aragua, Maracae, collected from seeds of *Bactris* sp., circa 1934, F. Zacher, neotype by Prevett 1966; deposited in The Natural History Museum, London (BMNH). The "type" in the collection of Linné should no longer be considered the type (despite the label in the Linnaean Collection). *Caryoborus luteomarginatus*: deposited in Naturhistoriska Riksmuseet, Stockholm (NR). *Caryoborus recticollis*: The collection of Chevrolat is housed at the Naturhistoriska Riksmuseet in Stockholm (NR), but the type of *Caryoborus recticollis* is missing. The original description by Chevrolat, and the collection locality fits that of *Pachymerus bactris*. *Caryoborus recticollis* is synonymized with *Dermestes bactris*. A neotype of *C. recticollis* may eventually be needed to stabilize the taxonomy. Because all types are in the general collection at the Stockholm museum, the entire collection must be studied in order to discover a possible neotype, or a misplaced holotype.

Prevett 1966 incorrectly designated the neotype as *Bruchus bactris*. The correct neotype name should be *Dermestes bactris*.

Distribution .—(Fig. 6). Specimens examined, 57. Brazil (Amazonas), Colombia, Ecuador, French Guiana, Guyana, Panama, and Venezuela (Aragua).

Diagnosis.— Dark brown, golden pubescent almost totally covering integument color, setae very dense, coarse, contrasting with surrounding strial intervals along mesal margin of elytron , often appearing as a light colored band.. Males 7.4-11.8 mm, females 8.0-9.0 mm in length (pronotum-elytra); width of males 4.4-6.2 mm, females 4.8-5.7 mm, maximum thoracic depth of males 3.8-5.2 mm, females 4.5-5.0 mm. Antennal segments 4 not serrate, segment 5-10 serrate, longer than wide. Eyes approximate. Disk of pronotum wider than long (length/width ratio mean 0.70). Metafemur almost twice as long as wide in the male (length width ratio mean, male 1.97, female 1.66); pecten with sexual dimorphism, in males not produced, straight, in females vaguely produced, curved, with 14-17 denticles, denticle 1 acuminate and longer (in the males usually all denticles small, except denticle 1 and the last denticle, and sometimes hard to see), 1 apical tubercle; prepectenal ridge shorter than pecten, without spines. Metatibia with two strong ventral carinae, middle ventral carina not uniform (crooked), outer ventral carina obsolete. Pygidium as wide as long (length/width ratio mean 1.00).

Males.—Integument. Hirsute, base of each seta in a minute puncture (therefore minutely punctulate where setae have been removed). Gula, ventral part of gena, apical
end of proepimeron (with golden setae lining the margin), metacoxa trochanter, and part of mesal side of metafemur glabrous. *Color.* Body and appendages uniform dark brown.

Vestiture. Setae often lost on parts of the body, possibly due to rubbing. Dorsal and ventral body surfaces with golden, medium texture, short, recumbent, moderately dense to sparse, uniform setae; antenna with minute yellowish-white uniform setae and longer sparsely irregular setae; elytron surface densely hirsute, along mesal margin of elytron setae very dense, coarse, contrasting with surrounding strial intervals, often appearing as a light colored band, protibia and mesotibia with coarse, golden, moderately dense to dense setae apically; metatibia lacking golden setae, except a few golden setae inside apex of mucro; ventral ridge of metafemur with long golden setae covering pecten; tarsomere 1 with moderately dense, golden setae, ventral side of tarsomere 3 with very dense, coarse, golden setae; pygidium not as densely hirsute as elytron.

Head. About as long as pronotum; frons and vertex with median glabrous carina, carina at vertex not interrupted by a weak depression (Fig. 96); ocular sinus short; on dorsal side eyes approximate; postocular lobe short but distinct. Antenna shorter than elytra, antennal segment 4 not serrate, segments 5-10 serrate longer than wide. Gena long; sides of submentum converging triangularly between the eyes, distance between eyes on ventral side intermediate.

Prothorax. Disk wider than long (length/width ratio mean 0.70); sides and base with strong, impressed, marginal line; anterior margin straight, marginal line tapering toward middle, medially line weak or absent (covered by setae); angles vaguely pointed, usually visible in dorsal view; medial dorsal surface flattened, more flattened posteriorly, often with weak but clear sulci towards sides, moderately to densely punctate (punctations hard to see covered by setae); sides depressed, sharply depressed toward apex, arcuate, narrowed to apex from slightly more than middle of side; angles of lateral margin at base produced, angle about 90°; posterior margin arcuate, produced medially; strong lateral prothoracic carina complete, extending from base to apex. Protarsus 1 shorter and wider than metatarsus 1. Prosternum completely separating procoxae, apex of prosternal process medium to wide.

Mesothorax and Metathorax. Scutellum small, subquadrate. Elytron with dorsal surface feebly convex between humerus and mesal margin, depressed laterally and apically; humerus weakly scabrous (covered by setae); striae punctate. Metafemur only feebly incrassate, elongate, almost twice as long as wide (length/width ratio mean 1.97), sharply expanded from base, with a sinuated carina near base (males only), interrupted with an abrupt bend, produced or strongly produced, margin after bend first emarginate, then arcuate, maximum width closer to base, constricted towards apex; ventral side with a very long, nonproduced pecten, covered with long golden setae on both lateral and mesal side, armed with 14-17 denticles; denticle 1 long, acuminate, closer to femoral base than to apex; following denticles usually much smaller in size, mostly covered by setae, the last denticle usually larger than preceding, feebly tuberculate; one apical tubercle, 2-3 denticles before apical denticle in a weak sulcus; when leg flexed, tibia positioned on mesal side of pecten; prepectenal ridge much shorter than pecten, covered by golden setae, without spines; lateral side with small punctures, usually not visible under setae. Metatibia not evenly arcuate, distinct basal bend (angle 90°), two very strong ventral carinae, inner carina strong fusing with middle carinae at apex of mucro, middle carina strong, not uniform (crooked), with a tubercle near base, and a short sulcus distal to tubercle, furrow between carinae, outer carina obsolete; lateral carina strong extending 100% of tibia, closer to dorsolateral carina at 3/4 length of tibia from base; dorsolateral carinae medium strength at apex tapering towards base only extending 75% of tibia; mesal carina strong at apex tapering towards base only extending 60% of tibia, dorsomesal carinae strong at apex tapering towards base only extending 85% of tibia; all except ventral carinae partly covered by setae; mucro medium size; tibial corona smooth, without spines; spur clearly visible in lateral view, covered with setae; mesotarsus 1 shorter and wider than metatarsus 1. Mesosternal process vaguely slanting, projecting to almost 90° angle from body plane, apex feebly curved back toward plane of metasternum; spinasternum posterior to the process produced.

Abdomen. Sternum 1 about as long as remaining sterna. Pygidium punctulate, moderately convex to flat in lateral view, as wide as long (length/width ratio mean 1.00), wider at base than apex, often not hidden by the elytra, elytra cover 0-40% of pygidium length from base, at almost 90° angle to elytra but usually slightly visible in dorsal view.

Genitalia. Median lobe (Fig. 175). Ventral valve long with sides forming a triangle with an acute angle. Internal sac without armature. Lateral lobes (Fig. 176) confluent, not separated, with gemmae, without cleft, apex with vague median notch and line-like sinus. Kingsolver's band absent.

Females.— Similar to males, but maximum thoracic depth slightly larger. Sexual dimorphism of metafemur, incrassate, not as elongate as in males (length/width ratio mean 1.66), without sinuate carina, and no abrupt bend, pecten vaguely produced, not as long, arcuate, denticles before apical tubercles not in a sulcus or only very vague sulcus, setae covering denticles not as dense on mesal side, and prepectenal ridge only weakly emarginate. Bursa copulatrix without armature.

Specific Records.—Host records are from collection labels, spelled exactly as written, and should be verified. It is uncertain if the original specimen is the same as the specimen designated as a neotype (Prevett 1966). Bruchids corresponding to the neotype have been collected from *Astrocaryum;* sp., *Astrocaryum standleyanum* L.H. Bailey (det. N. Smythe, Smithsonian Tropical Research Institute, pers. comm.). The original type was collected from *Bactris minor;* Jacq. (det. N.J. Jacquin, 1763). Brazil: Amazonas, Manaus, X.1944, F. Johnson (CDJ). Colombia: In palm seed, quarantine Miami, 13.VI.1977 (USNM). Ecuador: Cañar, Yanayacu, 17.IX.1982, G.V. Manley (CDJ). French Guiana: Cayenne, Kourou, 3.VI.1986, E.G. Riley & D.A. Rider (LSU). Guyana: Lansberg (UZMC); Piste de St. Elie, ex *Astrocaryum* seeds, 15.VIII.1986, (USNM). Panama: Arrajan, trap catch, I-X.1947, J. Zetek (USNM); Canal Zone, Barro Colorado Island, 3.XII.1930, F.E. Lutz (USNM); Canal Zone, Barro Colorado Island, VI-VIII.1942, J. Zetek (USNM); Canal Zone, Barro Colorado Island, at light, 7-13.IV.1959, (FMNH); Canal Zone, Barro Colorado Island, I-III.1944, (USNM); Canal Zone, Barro Colorado Island, beating dead palm leaves, 8.VII.1961, 3.VIII.1961, 15.VII.1961, J.M. Campbell (FDA & CNC); Canal Zone, Barro Colorado Island, at light, 9.VII.1961, (CNC); Canal Zone, Barro Colorado Island, 13.VII.1963, (CNC); Canal Zone, Barro Colorado Island, 10.V.1982, R.B. & L.S. Kimsey (UCD); Canal Zone, Barro Colorado Island, ex seeds *Astrocaryum standleyanum* L.H. Bailey, fruit collected from trees V.1988, fruit opened V.1989 and live adults not yet emerged was collected, N. Smythe (JAN); Canal Zone, Fort Kobbe, 10.VI.1976, E.G. Riley (RIL); Archipelago de las Perlas, San José Island, at light, 11.VII.1944, Morrison (USNM); Tabogilla, 21.II.1912, A. Busck (USNM). Venezuela: Aragua, Maracae, collected from seeds of *Bactris* sp., circa 1934, F. Zacher, *neotype*, (BMNH); Carret, Moroncoro, Rm 118, III.1979, (UCV); Rio Taguaza, alt. 200m, Edo. Miranda, P.N. Guatopo (BOR).

Discussion.—This species was first described in a 1762 letter to N.J. Jacquin and later published by Jacquin (1763) as a footnote together with the description of *Bactris minor.* Johansson and Linné redescribed the species (1763), and this work was considered the original description for many years (however, only Linné was given credit for the description). Schreibers (1841) published all of Linné's correspondence to N.J. Jacquin, including the 1762 letter with the description. Since the letter was not published until 1841, the 1763 footnote description in Jacquin's publication is used as the original description.

Prevett (1966) designated a neotype of *Bruchus bactris* (the correct name of the type is *Dermestes bactris*) and stated that the "type" at the collection of Linné in London is not the original type but a non-Pachymerinae bruchid. The neotype is deposited in The Natural History Museum,London, (BMNH). The specimen of the species designated as neotype does not appear to use *Bactris minor* Jacq. as a host plant, and might, for this reason, be a different species than described by Linné. But the designation was necessary to stabilize the classification and to separate this species from closely related species of *Pachymerus*.

Chevrolat's original description and the collection locality of *Caryoborus recticollis* fits *Pachymerus bactris*. At the time Chevrolat described this species, all palm bruchids were placed in *Caryoborus*, and the type (*Dermestes bactris*) has been lost since the time of Linné and his students. This might explain why Chevrolat named *C. luteomarginatus* and *C. recticollis*. The type of *C. luteomarginatus* is a specimen with the typical elytral setation found in *P. bactris*, a light colored band along the mesal margin of the elytron. In contrast *C. recticollis* is without this light colored band. Most specimens of *P. bactris* observed have this band, but it is missing in some. Hence, Chevrolat described these two varieties as two different species.

Pachymerus bridwelli (Prevett), **new combination.**

Figs. 12, 81, 181-184

Pachymeroides bridwelli Prevett 1966a:81.
Butiobruchus bridwelli: Prevett 1966b:183.

Type Data.—Type locality: Paraguay. Holotype female, Paraguay, 1938, M.J. Viana; deposited in The Natural History Museum, London (BMNH). Two paratypes, one deposited in The Natural History Museum, London (BMNH), one deposited in Muséum National d'Histoire Naturelle, Paris, (MNHP).

Distribution .—(Fig. 3). Specimens examined, 37. Argentina (Corrientes, Entre Rios, Formosa, Misiones), Paraguay and Uruguay.

Diagnosis.— Red brown to dark brown, white pubescence only partly cover integument color.. Males 7.7-12.3 mm, females 8.6-13.2 mm in length (pronotum-elytra); width of males 4.2-6.4 mm, females 4.2-6.2 mm, maximum thoracic depth of males 2.3-4.3 mm, females 3.3-4.7 mm. Antennal segments 4 not serrate, segment 5-10 serrate, slightly longer than wide. Eyes distant. Disk of pronotum wider than long (length/width ratio mean 0.78). Metafemur often twice as long as wide (length/width ratio mean 1.95); pecten vague, not produced, curved, with 13-16 denticles, denticle 1 acuminate and short, 3rd or 4th denticle usually the longest, two apical tubercles; prepectenal ridge very short almost nonexistent, without spines. Metatibia with two strong ventral carinae, outer ventral carina usually obsolete. Pygidium usually longer than wide (length/width ratio mean 1.1).

Males.—Integument. Hirsute, base of each seta in a minute puncture (therefore minutely punctulate where setae have been removed). Gula, ventral part of gena, apical end of proepimeron (with pale yellow setae lining the margin), metacoxa near trochanter, and part of mesal side of metafemur glabrous. *Color.* Body and appendages reddish brown to dark brown.

Vestiture. Setae often lost on part of the body, possibly due to rubbing. Dorsal and ventral body surface with white, fine texture, short, recumbent, moderately dense, uniform setae; ventral body surface with white, fine texture, short, recumbent, moderately dense, uniform setae; antenna with minute, white, uniform, sparse setae and longer, pale golden, sparsely irregular setae; elytron surface moderately hirsute, protibia and mesotibia with long, coarse, golden, moderately dense to dense setae apically; metatibia lacking golden setae, except a few golden setae inside apex of mucro; ventral ridge of metafemur with slightly longer white setae partly covering pecten; tarsomere 1 with moderately dense, golden setae, ventral side of tarsomere 3 with very dense, coarse, golden setae; pygidium about as hirsute as elytron, setae slightly longer.

Head. Shorter than pronotum; frons and vertex with a weak glabrous carina, carina at vertex not interrupted by a weak depression (Fig. 96); ocular sinus short; on dorsal side eyes distant; postocular lobe short but distinct. Antenna shorter than elytra, antennal segment 4 not serrate, segments 5-10 serrate, longer than wide. Gena short; sides of submentum between eyes almost parallel, on ventral side eyes approximate.

Prothorax. Disk wider than long (length/width ratio mean 0.78); sides and base with strong, impressed, marginal line; anterior margin straight, marginal line tapering toward middle, often no line medially; angles vaguely pointed, often not visible in dorsal view; medial dorsal surface convex, less convex posteriorly, densely punctate; sides depressed, sharply depressed toward apex, arcuate, narrowed to apex from slightly more than middle of side; angles of lateral margin at base produced, angle greater than 90°; posterior margin arcuate, produced medially; strong lateral prothoracic carina complete, extending from base to apex. Protarsus 1 shorter and wider than metatarsus 1. Prosternum completely separating procoxae, apex of prosternal process narrow.

Mesothorax and Metathorax. Scutellum small, quadrate. Elytron with dorsal surface feebly convex between humerus and mesal margin, depressed laterally and apically; humerus feebly scabrous (often covered by setae); striae punctate. Metafemur incrassate, often twice as long as wide (length/width ratio mean 1.95), maximum width closer to base, constricted towards apex; ventral side with a very weak pecten, partly covered with long white setae on lateral side, armed with 13-16 denticles; denticle 1 acuminate, short, very close to femoral base; denticles 2 and 3 increasing in size, denticles becoming more tuberculate towards apex; two apical tubercles; when leg flexed, tibia positioned on mesal side of pecten; prepectenal ridge very short almost nonexistent, moderately covered with setae, without spines; lateral side with small punctures, often not visible under setae. Metatibia evenly arcuate (angle > 90°), two very strong ventral carinae, inner carina strong fusing with middle carinae at apex of mucro, middle carina strong, usually uniform (not crooked), with a tubercle near base, without a sulcus distal to tubercle, furrow between carinae, outer carina usually obsolete or sometimes very weak and short, only feebly visible by the tubercle; lateral carina strong extending 100% of tibia, distance to dorsolateral carina, measured at the base of mucro, about the same, as if measured from 3/4 length of tibia (75% of distance from base of tibia); dorsolateral carinae strong at apex, tapering slowly towards base extending 60-80% of tibia; mesal carina strong extending 100% of tibia; dorsomesal carinae strong at apex tapering slowly towards base extending 60-90% of tibia; all carinae except ventral partly covered by setae; mucro medium size; tibial corona smooth, without spines; spur clearly visible in lateral view, covered with setae; mesotarsus 1 shorter and wider than metatarsus 1. Mesosternal process slanting, projecting to much less than 90° angle from body plane, apex gradually curved back towards the plane of metasternum; metaspinasternum feebly produced.

Abdomen. Sternum 1 about as long as remaining sterna. Pygidium punctulate, punctations often covered by setae, convex in lateral view, longer than wide, wider at base than apex, partly hidden by the elytra, elytra cover 20-40% of pygidium length from base, but at almost 90° angle to elytra and usually not visible in dorsal view.

Genitalia. Median lobe (Fig. 183) slender. Ventral valve long with sides forming a triangle with an acute angle. Internal sac without armature. Lateral lobes (Fig. 184) confluent, not separated, with gemmae, without cleft, apex with vague median notch and line-like. Kingsolver's band absent.

Females.— Similar to males, but maximum thoracic depth slightly larger. Bursa copulatrix without armature (Fig. 182).

Specific Records.—Host records are from collection labels, spelled exactly as written, and should be verified. Argentina: Corrientes, Bella Vista, (BR); Entre Rios, Concordia, (BR); Entre Rios, Primero de Mayo, ex. fruto de palmera "yatay", 1937, M.J. Viana, *paratype* (MNHN); Entre Rios, en palmeras "yatay", 22.XII.1958, XII.1958, XI.1959, XII.1959, 16.XII.1959, 211960, 22.X.64, L.A. Gontero (FML); Entre Rios, ex. *Cocos* (prob. yatay), 1973 (USNM); Formosa, XI.1950, J. Daguerre (USNM); Formosa, Laguna Blanca, X.48, Morel (FML); Misiones, Iguazú, 1950, W.H. Partridge (BR). Paraguay: 1938, M.J. Viana, *holotype* (BMNH); Sapucay (CNC). Uruguay: Montevideo, XII.35 (CNC); ex. seeds of *Butia capitata*, 25.II.57, Div. Plant Prot. Dept. Agr. Israel, *paratype*, (BMNH).

Discussion.—This species was first placed in the genus *Pachymeroides* (Prevett 1966a). The name Pachymeroides was preoccupied and changed to *Butiobruchus* (Prevett 1966b). Only one species of *Butiobruchus* has been described and Prevett's (1966a) description was based on only three female specimens. After study of male specimens *Butiobruchus bridwelli* is moved to *Pachymerus*.

Since the shape of the submentum is an important taxonomic character, it should be noted, to avoid confusion, that gula and submentum are not defined as Prevett (1966b). Also, the base of antennal segments 2 and 4, the primary characters used by Prevett (1966a) to separate *Butiobruchus* from *Pachymerus,* is not used. He stated that the base is impressed in species of *Pachymerus* but not in *Butiobruchus.* This character is highly variable (Prevett only studied three specimens) in both genera, and depends on the angles of the antennal segments to each other since the segments articulate.

If the classification is based on monophyletic groups, *Butiobruchus* can not be a valid genus. This becomes very clear when studying the gemmae on the lateral lobes of the male genitalia. All species in *Pachymerus,* including *P. bridwelli,* have gemmae, except *P. cardo.* So if *Butiobruchus* is considered a valid genus, *P. cardo* must also be considered a separate genus because of the absence of gemmae. There are external characters that could be used to separate *P. bridwelli* into a separate genus (shape of pecten, width of metafemur, absence of tibial sulcus and width of submentum). But both male and female genitalia indicate a very close relationship. Nilsson (1992) believed similarities in genitalic characters, especially the male gemmae and absence of sclerites in the internal sac, were more important than differences in external characters. The female genitalia in *Pachymerus* are distinctly different from the female genitalia of other Pachymerini genera. Females of *P. bridwelli* are typical *Pachymerus.* Furthermore, the external characters of *P. cardo* are also definitely *Pachymerus.* For these reasons *Butiobruchus* Prevett is synonymized with *Pachymerus* Thunberg.

Pachymerus cardo (Fåhraeus)

Figs. 6, 83,109, 157 - 160

Bruchus cardo Fåhraeus *in* Schönherr 1839:127.
Pachymerus cardo: Pic 1913:7; Prevett 1966b:185; Udayagiri and Wadhi 1989:242.

Type Data.—Type locality: Pará, Brazil. Holotype, Brazil, Para, Klug; deposited in Naturhistoriska Riksmuseet, Stockholm (NR). One paratype, Brazil, Pará, coll. Chevr.; deposited in NR.

Distribution.— Specimens examined, 745. *New World.* Argentina (San Juan), Belize, Bolivia (El Beni, Santa Cruz), Brazil (Amazonas, Bahia, Maranhao, Matto Grosso, Matto Grosso do Sul, Pará, Paraíba, Paraná, Rio de Janeiro, São Paulo), Colombia (Magdalena, Valle del Cauca), Costa Rica, French Guiana, Guatemala, Guyana, Mexico, Nicaragua, Panama, Paraguay (Cordillera), Peru (Loreto), Suriname, Trinidad, Venezuela (Amazonas, Aragua, Barinas, Bolivar, Carabobo, Guárico, Monagas, Zulia). *Old World.* Introduced into Congo, Ghana and Nigeria.

Diagnosis.— Dark brown, golden pubescence almost totally covers integument color. Males 7.2-14.0 mm, females 7.4-14.3 mm in length (pronotum-elytra); width of males 4.0-7.0 mm, females 4.2-7.2 mm, maximum thoracic depth of males 2.9-4.8 mm, females 3.0-5.1 mm. Antennal segments 4 not serrate, segment 5-10 serrate, longer than wide. Distance between eyes intermediate. Disk of pronotum wider than long (length/width ratio mean 0.72). Metafemur less than twice as long as wide (length/width ratio mean 1.65); pecten curved, with 10-14 denticles, denticle 1 acuminate and longer, two apical tubercles (the normal number of apical tubercles is two but it often has only one and sometimes three); prepectenal ridge shorter than pecten, without spines. Metatibia with two strong ventral carinae, middle ventral carina uniform (not crooked) with a tubercle, outer ventral carina obsolete. Pygidium about as wide as long (length/width ratio mean 1.00).

Males.—*Integument.* Hirsute, base of each seta in a minute puncture (therefore minutely punctulate where setae have been removed). Gula, ventral part of gena, apical end of proepimeron (with golden setae lining the margin), metacoxa near trochanter, and part of mesal side of metafemur glabrous. *Color.* Body and appendages dark brown.

Vestiture. setae often lost on part of the body, possibly due to rubbing. Dorsal and ventral body surface with golden, fine texture, short, recumbent, moderately dense, uniform setae; ventral body surface with pale yellow, medium texture, short recumbent, dense, uniform setae; antenna with short, yellowish-white, uniform, sparse setae and longer, golden, sparsely irregular setae; elytron surface densely hirsute, protibia and mesotibia with long, coarse, golden, moderately dense to dense setae apically; metatibia lacking golden setae, except a few golden setae inside apex of mucro; ventral ridge of metafemur with long pale yellow setae covering pecten; tarsomere 1 with moderately dense, golden setae, ventral side of tarsomere 3 with very dense, coarse, golden setae; pygidium not as densely hirsute as elytron.

Head. Shorter than pronotum; frons and vertex with median hirsute carina, carina at vertex not interrupted by a weak depression (Fig. 96); ocular sinus short; on dorsal side eyes approximate or intermediate distance; postocular lobe short but distinct. Antenna shorter than elytra, antennal segment 4 not serrate, segments 5-10 serrate longer than wide. Gena long; sides of submentum feebly converging triangularly between the eyes, on ventral side eyes distant.

Prothorax. Disk wider than long (length/width ratio 0.72); sides and base with strong, impressed, marginal line; anterior margin feebly emarginate, marginal line tapering toward middle, medially line weak or absent (covered by setae); angles vaguely pointed, often not visible in dorsal view; medial dorsal surface convex, less convex posteriorly densely punctate (punctae often hard to see covered by setae); sides depressed, sharply depressed toward apex, arcuate, narrowed to apex from slightly more than middle of side; angles of lateral margin at base produced, angle more than 90°; posterior margin arcuate, produced medially; strong lateral prothoracic carina complete, extending from base to apex. Protarsus 1 shorter, but only slightly wider than metatarsus 1. Prosternum completely separating procoxae, apex of prosternal process medium width.

Mesothorax and Metathorax. Scutellum small, subquadrate. Elytron with dorsal surface feebly convex between humerus and mesal margin, depressed laterally and apically; humerus scabrous; striae punctate. Metafemur incrassate, maximum width closer to base, constricted towards apex; ventral side with a pecten, covered with long pale yellow setae on lateral side, armed with 10-14 denticles; denticle 1 long, acuminate, closer to femoral base than to apex; following denticles smaller in size, mostly covered by setae; two apical tubercles (the normal number of apical tubercles is two but it often has only one and sometimes three); when leg flexed, tibia positioned on mesal side of pecten; prepectenal ridge much shorter than pecten, covered with setae, without spines; lateral side with small punctures, usually not visible under setae. Metatibia evenly arcuate (angle >90°), two very strong ventral carinae, inner carina strong fusing with middle carinae at apex of mucro, middle carina strong, uniform (not crooked), with a tubercle near base, and a short sulcus distal to tubercle, furrow between carinae, outer carina obsolete; lateral carina strong, lateral carina strong extending 100% of tibia, distance to dorsolateral carina measured at the base of mucro, about the same as if measured from 3/4 length of tibia (75% of distance from base of tibia); dorsolateral carinae weak tapering fast towards base only extending 80-90% of tibia (sometimes only 20-30%); mesal carina strong extending 100% of tibia; dorsomesal carinae strong at apex tapering slowly towards base only extending 70-80% of tibia; all except ventral carinae often partly covered by setae; mucro medium size; tibial corona smooth, without spines; spur clearly visible in lateral view, partly covered with setae; mesotarsus 1 shorter, but only slightly wider than metatarsus 1. Mesosternal process slanting, projecting to much less than 90° angle from body plane, gradually curved back towards the plane of metasternum; spinasternum posterior to the process feebly produced.

Abdomen. Sternum 1 about as long as remaining sterna. Pygidium punctulate, convex in lateral view, about as wide as long (length/width ratio mean 1.00), wider at base than apex, partly hidden by the elytra, elytra cover 20-50% of pygidium length from base, but at almost 90° angle to elytra and usually not visible in dorsal view.

Genitalia. Median lobe (Fig. 159) slender. Ventral valve long with sides forming a triangle with an acute angle. Internal sac without armature. Lateral lobes (Fig. 160) confluent, not separated, without gemmae, without cleft, apex with vague median notch and line-like sinus. Kingsolver's band absent.

Females.— Similar to males, but maximum thoracic depth slightly larger. Bursa copulatrix without armature (Fig. 158).

Specific Records.—Only records with host plant associations included. Host records are from collection labels, spelled exactly as written, and should be verified. *New World.* Bolivia: Huachi, Rio Beni, ex *Attalea*, VIII.1921, O.E. White (USNM). Brazil: Amazonas, from palm fruit (BMNH); Amazonas, from fruits of *Elaeis melanococca* Gaert. Fruct. (BMNH); Bahia, em palmeiros, G. Bondar (FMNH); Pará ex *Attalea speciosa* Mart., 7.VII.1928, B. Krukoff (USNM); Rio de Janeiro, Botanical Garden, ex *Areca friandra* L., 3.VIII.1921, R.D. Kennedy (USNM); on journey from Rio de Janeiro, ex seeds *Scheelea leandroana* Barb. Rodr., 10.IV.1926, (USNM); Rio de Janeiro, quarantine New York, *Scheelea leandroana* Barb. Rodr., (USNM); 251919, on *Orbignya graciosa*, quarantine Washington D.C.; 15.X.1973, in seed of *Maximiliana regia* Mart., quarantine Miami, (USNM); from seeds *Cocos romanzoffiana* Cham.(USNM); in seeds *Elaeis guineensis* Jacq., 14.III.1958, I & P (USNM). Colombia: Valle del

Cauca, Palmira, reared seeds *Elaeis guineensis* Jacq., 15.IX.1983, L.C. Pardo (CDJ); Valle del Cauca, Rio Frio, Salonica, alt. 1150m, reared seeds *Attalea victoriana* Dugand, II.1982, C. Varela (CDJ); Valle del Cauca, 36km N. Roldanillo, seeds reared *Elaeis guineensis* Jacq., 20.VIII.1983, C.D. Johnson (CDJ). Costa Rica: Guanacaste, Peñas Blancas, hiding in mature *Scheelea* nut bunch on tree, 11.IX.1970, (USNM); Guanacaste, in oil palm seeds, XI.1967, (USNM). French Guiana: Cayenne, Piste de St Elie Pk15, 15 Aout 1986, graine d'*A. paramaca*, Plinio SIST Leg (ORST). Guatemala: In *Acrocomia sclerocarpa* Drude, (USNM). Guyana: Georgetown, botanical garden, ex seed *Maximiliana regia* Mart., 28.VI.1920, L.C. Griffith (USNM); Demerara river, ex seed *Maximiliana regia* Mart., C.E. Griffith (USNM). Nicaragua: In *Scheelea zonensis* L.H. Bailey , S. Kevorkien, (USNM). Panama: Canal Zone, Barro Colorado Island, ex *Scheelea*, 25.III.1964, L.J. Bottimer (USNM); Canal Zone, Summit, in seeds of *Elaeis guineensis* Jacq., VI.1928, J. Zetek (USNM); Canal Zone, Summit, in seed of *Scheelea zonensis* L.H. Bailey , 211937, J. Zetek (USNM); Canal Zone, Summit 3, on oil palm seeds, *Elaeis melanococca* Gaertn. Fruct., 22.IX.1949, J. Zetek (USNM); Canal Zone, Paraiso, ex old sheath of flowers *Attalea* palm, 1.II.1911, 30.IV.1911, E.A. Schwarz (USNM); Canal Zone, ex *Manicaria* sp., IX.1932, T.P. Hilditch (BMNH); Taberville, bred *Elaeis melanococca* Gaertn. Fruct., Chittenden (USNM); from Panama reared in Riverside, ex seeds of *Guilielma utilis* Oerst. (CDJ); ex *Martinezia caryotaefolia* H.B. & K. seeds, quarantine Hawaii, 16.IV.1932, (USNM); ex *Attalea gomphococca* Mart., quarantine, 8.VIII.1932 (USNM). Peru: Loreto, Jennaro-Herrera, Estero Cocha, es semin *Scheelea brachyclada* Burret, 8.X.1991, G. Couturier (ORST); with *Orbignya spectabilis* Burret nuts, quarantine New York, 13.V.1940, (USNM); in pkg *Attalea tessemannii* Burret, (USNM). Trinidad: Port-of-Spain, on *Elaeis guineensis* Jacq., 18.VI.1928, (USNM); Wordbrook, ex *Bactris cuesa* seed, (USNM); 2.IX.1936, ex *Englerophoenix* sp., quarantine New York (USNM); 2.VII.1934, ex *Maximiliana caribaea* Griseb. & H. Wendl. ex Griseb., quarantine Washington, D.C., (USNM); ex *Elaeis guineensis* Jacq., H.L. Sanford (USNM). Venezuela: Amazonas, Cano Iguana, de frutos de palma de Cucurito, XI.1982, (BOR), La Esmeralda, Expedition Fco Alto Orinoco, VI.1951, (USNM); Aragua, Maracay, 9.II.1989 (emerged 30.III.1989), from palmseed on ground, C.D. Johnson (CDJ); Barinas, W. of Barinas, 21.X.1973 (emerged late Feb.1974), D. Janzen (USNM); Barinas, 52km S.of Barinas, 12.III.1989 (emerged 20.IV.1989), in *Scheelea* palm?, C.D. Johnson (CDJ); Carabobo, Palma Sola, ex *Scheelea*, 041948, D.W. Jenkins (USNM); Carabobo, Tucuyito, 9.VIII.1937, in seed of *Attalea speciosa* Mart., C.H. Ballou (USNM); D.F., Caracas, en semillas de palma, 24.X.1983, G. Yepes (UCV); Guárico, Calabozo, Est. Biol. de los Llanos, ex *Copernicia tectornya*, 18.XII.1982, (CDJ); Zulia, 19km S. El Guayabo, in seeds of palm, C.D. Johnson, 21.II.1989 (emerged 30.III.1989) (CDJ); Zulia, La Fria, ex *Scheelea*, D.W. Jenkins (USNM); Cascara, 181948, ex *Scheelea macrolepis* Burret, (USNM); 08.IV.1935, with palm seed, quarantine CE Prince, (USNM); 30.VII.1936, ex Cohune palm, quarantine New York, (USNM); 27.II.1950, ex *Scheelea maracaibensis* Burret, quarantine Miami, (USNM). *Old World*. Congo: Brazzaville, noix de palme, 28.XI.86, 20.III.87, A. Delobel (ORST). Nigeria: U.C. Ibadan, kernel of *Elaeis guineensis* Jacq., , 25.VI.1959, G.H. Caswell (BMNH).

Discussion.—It is possible that this species was originally described by Klug. However, Fåhraeus has been given credit for the name, and we have not been able to find a description of this species by Klug. The original description appears to be the one in Schönherr 1839, where Klug is written after the species name. Fåhraeus' name is given after the description, indicating that he described the species. Klug collected the holotype, and perhaps he suggested the name, and for this reason (since there were no consistent taxonomic rules in 1839) Klug's name was printed after the species name in this publication.

The specimens reported from Mexico and Belize were intercepted in U.S. quarantine. The true collection locality is uncertain.

Pachymerus nucleorum (Fabricius)

Figs. 4, 13, 50, 51, 58, 64, 67, 87, 108, 169 - 172

Bruchus bactris: Herbst 1783:28 (*nec* Linné 1762).
Bruchus nucleorum Fabricius 1792:369; Gyllenhal *in* Schönherr 1833:92.
Pachymerus nucleorum: Pic 1913:8; Bridwell 1929:159; Prevett 1966b:188; Udayagiri and Wadhi 1989:244.
Caryoborus lacerdae Chevrolat 1877:106. **New Synonymy.**
Pachymerus lacerdae: Prevett 1966b:160.
Pachymerus olearius Bridwell 1929:160. (Prevett 1966b:189 = *lacerdae* Chevrolat). **New Synonymy.**

Type Data.—Type locality: Unknown. Two syntypes of *Bruchus nucleorum* are deposited in

Universitetets Zoologisk Museum, Copenhagen (UZMC). Fabricius described this species from specimens misidentified by Herbst as *Bruchus bactris*. No type or collection labels were on the types. One of the two syntypes is designated lectotype here: Amer. Islands, lectotype by Nilsson 1992 (UZMC). The other syntype is considered a paralectotype. Both Herbst and Fabricius indicated that the beetles were from "Indiae Nucleis" (F. 1792) and "Oßtindien" (=East India). Since all Pachymerini are of New World origin this information is probably incorrect. It would not be likely that it could have been introduced and collected here, since world communication at this time was not very good. It is not uncommon for old material to possess erroneous locality data. *Caryoborus lacerdae*: Bahia, Brazil; deposited in Naturhistoriska Riksmuseet, Stockholm, Sweden. *Pachymerus olearius*: Brazil; deposited in the U.S. National Museum, Washington, D.C. (USNM).

Distribution .—(Fig. 4).—Specimens examined, 201. *New World*. Argentina, Bolivia (Beni, Pando, Santa Cruz), Brazil (Amazonas, Bahia, Espirito Santo, Maranhão, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Pará, Paraná, Pernambuco, Rio de Janeiro, Rio Grande do Sul, Rondonia, São Paulo), Paraguay (Amambay). *Old World*. Introduced to São Tomé e Príncipes.

Diagnosis.— Red brown, dark brown to almost black, greyish-white pubescence only partly covers integument color. Males 8.5-15.5 mm, females 9.2-16.3 mm in length (pronotum-elytra); width of males 3.8-7.4 mm, females 2.3-7.5 mm, maximum thoracic depth of males 3.0-4.5 mm, females 3.5-6.4 mm. Antennal segments 4 not serrate, segment 5-10 serrate, longer than wide. Eyes distant. Disk of pronotum only slightly wider than long (length/width ratio mean 0.80). Metafemur slightly less than twice as long as wide (length/width ratio mean 1.81); pecten curved, with 7-12 denticles, denticle 1 acuminate and longer, last denticle large, tuberculate (followed by one apical tubercle), a shallow sulcus between last denticle and the other pectenal denticles, or a very large fused denticle (last pectenal denticle fused with one or two of the smaller basad pectenal denticles); one apical tubercle; prepectenal ridge shorter than pecten, without spines. Metatibia with two strong and one very weak ventral carinae, middle ventral carina not uniform (crooked), with a tubercle, outer ventral carina present, weak, usually short. Pygidium wider than long (length/width ratio mean 0.89).

Males.—Integument. Hirsute, base of each seta in a minute puncture (therefore minutely punctulate where setae have been removed). Gula, ventral part of gena, apical end of proepimeron (with usually white or pale yellow setae lining the margin), metacoxa near trochanter, and part of mesal side of metafemur glabrous. *Color*. Body and appendages uniform red brown, dark brown to almost black.

Vestiture. Setae often lost on part of the body, possibly due to rubbing. Dorsal and ventral body surface with greyish-white, fine texture, short, recumbent, moderately dense, uniform setae; ventral body surface with greyish-white, medium texture (coarser and longer on ventral side, some may have pale yellowish-white setae, but never clear yellow or golden), short, recumbent, moderately dense to sparse, uniform setae; antenna with minute, white, uniform, setae; elytron surface densely to sparsely hirsute, protibia and mesotibia with long, coarse, golden, moderately dense to dense setae apically; metatibia lacking golden setae, except a few golden setae inside apex of mucro; ventral ridge of metafemur with greyish-white setae partly covering pecten; tarsomere 1 with moderately dense, golden setae, tarsomere 2 with sparse golden setae, ventral side of tarsomere 3 with very dense, coarse, golden setae; pygidium usually not as densely hirsute as elytron.

Head. Shorter than pronotum; frons and vertex with median hirsute or vaguely glabrous carina, carina at vertex not interrupted by a weak depression (Fig. 96); ocular sinus short; on dorsal side eyes distant; postocular lobe medium size. Antenna shorter than elytra, antennal segment 4 not serrate, segments 5-10 serrate, longer than wide. Gena long; sides of submentum strongly converging between the eyes, on ventral side eyes distant.

Prothorax. Disk slightly wider than long (sometimes appear as if quadrate, length/width ratio mean 0.80); sides and base with strong, impressed, marginal line; anterior margin arcuate, marginal line tapering toward middle, medially line weak or absent (usually covered by setae); angles rounded, not visible in dorsal view; medial dorsal surface convex, less convex posteriorly densely punctate; sides depressed, sharply depressed toward apex, arcuate, narrowed to apex from slightly more than middle of side; angles of lateral margin at base feebly rounded, angle more than 90°; posterior margin arcuate, produced medially; strong lateral prothoracic carina complete, extending from base to apex. Protarsus 1 shorter and wider than metatarsus 1. Prosternum completely separating procoxae, apex of prosternal process usually narrow.

Mesothorax and Metathorax. Scutellum small, subquadrate. Elytron with dorsal surface feebly convex between humerus and mesal margin, depressed laterally and apically; humerus scabrous; sometimes covered with setae, striae punctate (stria 1 see Fig. 50). Metafemur incrassate, maximum width closer to base, constricted towards apex, slightly less than twice as long as wide (length/width ratio mean 1.81); ventral side with a pecten, partly covered with greyish-white setae, especially on lateral side, armed with 7-12 denticles; denticle 1 long, acuminate, closer to femoral base than to apex; following denticles smaller in size, mostly covered by setae, the last denticle large, tuberculate (followed by one much smaller apical denticle); the first large, often with a shallow sulcus between last denticle and the other pectenal denticles, or a very large fused denticle (last pectenal denticle fused with one or two of the smaller basal pectenal denticles); when leg flexed, tibia positioned on mesal side of pecten; one apical tubercle, prepectenal ridge much shorter than pecten, covered with setae, without spines; lateral side with small punctures, often not visible under setae. Metatibia not evenly arcuate, distinct basal bend (angle close to 90°), 2 very strong ventral carinae, inner carina strong fusing with middle carinae at apex of mucro, middle carina strong, not uniform (crooked), with a tubercle near base, and a short sulcus distal to tubercle, furrow between carinae, outer carina medium strength at base, tapering, extending from base to 40-50% of tibia (some only extending to distal end of sulcus); lateral carina strong extending 100% of tibia, distance to dorsolateral carina measured at the base of mucro, about the same as if measured from 3/4 length of tibia (75% of distance from base of tibia); dorsolateral carinae medium strength at apex tapering slowly towards base only extending 90-95% of tibia (sometimes 100%); mesal carina strong extending 100% of tibia; dorsomesal carinae strong at apex tapering slowly towards base only extending 85% of tibia; carinae usually not covered by setae; mucro medium size to short; tibial corona smooth, without spines; spur clearly visible in lateral view, not covered with setae; mesotarsus 1 shorter and wider than metatarsus 1. Mesosternal process slanting, gradually curved back towards the plane of metasternum, projecting to much less than 90° angle from body plane (in some specimens almost in plane of body); spinasternum posterior to the process only feebly produced.

Abdomen. Sternum 1 about as long as remaining sterna. Pygidium punctulate, convex in lateral view, slightly wider than long (length/width ratio mean 0.89), wider at base than apex, partly hidden by the elytra, elytra cover 20-50% of pygidium length from base, but at almost 90° angle to elytra and usually not visible in dorsal view.

Genitalia. Median lobe (Fig. 171) slender. Ventral valve long with sides forming a triangle with an acute angle. Internal sac without armature. Lateral lobes (Fig. 172) confluent, not separated, with gemmae, without cleft, apex with vague median notch and line-like sinus. Kingsolver's band absent.

Females.— Similar to males, but maximum thoracic depth slightly larger. Bursa copulatrix without armature (Fig. 170).

Specific Records.—Only records with host plant associations included. Host records are from collection labels, spelled exactly as written, and should be verified. Argentina: ex *Acrocomia* seeds quarantine San Pedro, Los Angeles County, California, (CDFA). Brazil: Bahia, em palmeiros, G. Bondar (FMNH); Maranhão, coco palm nuts, E.C. Green (USNM); Mato Grosso do Sul, quarantine D.C., ex *Acrocomia sclerocarpa* Drude, Porto Murtinho (USNM); Pará, *Attalea speciosa* Mart. nuts, 7.7.28, B. Krukoff (USNM); quarantine New York, reared from Babassu nuts (USNM); *Acrocomia* sp., 31.VIII.43, (CNC); quarantine Houston, in *Acrocomia* sp. nut, 8.31.43; quarantine Miami, in seed of *Orbignya* sp., (USNM); quarantine New York, on nuts *Cocos coronata* Mart., (USNM), quarantine Nogales, Arizona, in Babassu nuts, (CDJ). Paraguay: in *Acrocomia totai* Mart., 1957, (USNM); in *Acrocomia totai* Mart., 1951, Bomhard (USNM).

Discussion.—This species has two distinct forms, but it appears as if the populations are mixed. No form is more common in certain areas. One form has a large fused denticle (apical tubercle 1 fused with one or two of the basal pectenal denticles), the other form has a large shallow sulcus in the place of this large fused denticle (the size of the first apical tubercle is rather large, even in specimens with a sulcus). The reason for this variation is unknown.

Prevett (1966b) synonymized *P. olearius* with *P. lacerdae*. However, he recognized both *P. lacerdae* and *P. nucleorum* as valid species.

Pachymerus sveni Nilsson, **new species**

Figs. 5, 9, 24, 27, 59, 62, 88, 101-104, 161-163

Type Data.—Type locality: Belém, Brazil. Holotype male, Belém, Goeldi Museum, 10.II.1959, A.M. Nadler; deposited in the American Museum of Natural History, New York (AMNH). Allotype female, same data as holotype; deposited in AMNH. 29 paratypes. Brazil: (2) Amazonas, Agronomia INPA, ex seeds *Euterpe oleacea* Mart. (Açai do Pará), VII.87, Clement, C.(UFDP); (1) Bahia, 1319 (USNM); (3) Ceará, 11km SSW Fortaleza; ex seed *Copernicia cerifera* (Arr. Cam.) Mart., D. da Roche (USNM); (2) Pará, (KZ); (1) Pará, Belém, at night, 251969, L. & C.W. O'Brien (USNM); (1) Pará, Belém, Goeldi Museum, 10.II.1959, A.M. Nadler (AMNH); (1) Rio de Janeiro, palm seeds, Washington D.C. at quarantine, March-10-1914, E R Sasscer coll. (USNM); (3) Rio de Janeiro, ex seeds *Euterpe oleaceae* Mart., 19.XI. 1974, J. Donatti (USNM); (2) Rio Grande do Sul, São Luis, 7.II.1959, A.M. Nadler (AMNH); (2) Bowring 63 47 (BMNH); W-6039, 3-13-58-4623, ex *Bactris masaja*.; (1) ex seed *Bactris caryotifolia* Drude, quarantine Washington D.C. (USNM); (1) ex. *Desmoncus* sp., 2.V.1935, (seed on pin), H.Y. Gouldman (USNM); (7) ex seed Brazil, quarantine Miami, Florida, 22.II.49, (USNM). Venezuela: (1) Dto. Federal, Caracas, ex seed palmas, 24.X.1983, G. Yepez (UCV); (1) ex palm seed, 9.2.59, quarantine Hoboken, New Jersey (USNM).

Etymology .—Named after the first author's father and friend Sven Nilsson.

Distribution .—(Fig.5). Specimens examined, 31. Brazil (Amazonas, Bahia, Ceará, Pará, Rio de Janeiro, Rio Grande do Sul), Venezuela.

Diagnosis.— Dark brown to red brown, greyish-white pubescence (sometimes slightly yellowish) only partly covers integument color. Males 5.6-10.2 mm, females 5.7-10.0 mm in length (pronotum-elytra); width of males 2.6-4.6 mm, females 2.6-4.8 mm, maximum thoracic depth of males 1.4-4.0 mm, females 2.3-4.1 mm. Antennal segments 4 not serrate, segment 5-10 serrate, as wide as long. Eyes approximate. Disk of pronotum wider than long (length/width ratio mean 0.71). Metafemur less than twice as long as wide (length/width ratio mean 1.74); pecten curved, with 13-15 denticles, denticle 1 acuminate and longer, two apical tubercles; prepectenal ridge shorter than pecten, without spines. Metatibia with two strong ventral carinae, middle ventral carina uniform (not crooked), outer ventral carina obsolete. Pygidium slightly wider than long (length/width ratio mean 0.83).

Differential Diagnosis.—See COMPARISONS OF SPECIES IN PACHYMERUS.

Males.—*Integument.* Hirsute, base of each seta in a minute puncture (therefore minutely punctulate where setae have been removed). Gula, part of ventral side of gena, apical end of proepimeron (with golden or pale yellow setae lining the margin), metacoxa near trochanter, and part of mesal side of metafemur glabrous. *Color.* Body and appendages uniform dark brown to red brown.

Vestiture. Setae often lost on parts of the body, possibly due to rubbing. Dorsal and ventral body surfaces with greyish-white (rarely yellowish-white), fine texture, short, recumbent, moderately dense to sparse, uniform setae; antenna with minute white, uniform setae and longer golden, sparse, irregular setae; elytron surface moderately hirsute; protibia and mesotibia with coarse, golden, moderately dense to dense setae apically; metatibia lacking golden setae, except a few golden setae inside apex of mucro; ventral ridge of metafemur with long, golden setae covering pecten; tarsomere 1 with moderately dense, golden setae, tarsomere 2 with greyish-white, medium texture, dense setae, ventral side of tarsomere 3 with very dense, coarse, golden setae; pygidium usually not as densely hirsute as elytron. Elytron and pronotum disk almost non-hirsute in some specimens due to loss of setae.

Head. Shorter or as long as pronotum; frons and vertex with a prominent median, hirsute carina, carina weak at vertex, not interrupted by a weak depression (Fig. 96); ocular sinus short; on dorsal side eyes approximate; postocular lobe short but distinct. Antenna shorter than elytra, antennal segment 4 not serrate, segments 5-10 serrate as wide as long. Gena long; sides of submentum converging triangularly between eyes, on ventral side eyes distant.

Prothorax. Disk wider than long (length width ratio mean 0.71); sides and base with strong, impressed, marginal line; anterior margin straight or emarginate, marginal line tapering toward middle, medially line weak or absent; angles rounded, often not visible in dorsal view; medial dorsal surface usually flattened, more flattened posteriorly, densely punctate; sides depressed, sharply depressed towards apex, arcuate, narrowed to apex from slightly more than middle of side; angles of lateral margin at base produced, angle slightly more than 90°; posterior margin arcuate, produced medially; strong lateral prothoracic carina complete, extending from base to apex. Protarsus 1 shorter and slightly wider than metatarsus 1. Prosternum completely separating procoxae, apex of prosternal process medium width.

Mesothorax and Metathorax. Scutellum small, subquadrate. Elytron with dorsal surface feebly convex between humerus and mesal margin, depressed laterally and apically; humerus scabrous, usually covered with setae; striae punctate. Metafemur, incrassate, expanded from base, with a sinuated carina near base (this feature exists in both males and females), with a weakly to moderately produced bend, margin after bend not emarginate or only vaguely so, then arcuate, maximum width approximately at middle of femur or slightly closer to base, constricted towards apex, less than twice as long as wide (length/width ratio mean 1.74); ventral side with a long, vaguely produced pecten, covered with long, golden setae, armed with 13-15 denticles; denticle 1 long, acuminate, closer to femoral base than to apex; following denticles smaller in size, mostly covered by setae on lateral side, the last denticle usually much larger than preceding, tuberculate; two apical tubercles; when leg flexed, tibia positioned on mesal side of pecten; prepectenal ridge much shorter than pecten, covered with setae, without spines; lateral side with small punctures, usually feebly visible under setae. Metatibia not evenly arcuate, (angle at basal end slightly more than 90°); two very strong ventral carinae, inner ventral carina strong fusing with middle carinae at apex of mucro, middle ventral carina strong, uniform (not crooked), with a tubercle near base, and a very short sulcus distal to tubercle, furrow between carinae, outer carina obsolete; lateral carina strong extending 100% of tibia, distance to dorsolateral carina measured at the base of mucro, about the same as if measured from 3/4 length of tibia (75% of distance from base of tibia); dorsolateral carinae strong at apex tapering towards base only extending 75% of tibia; mesal carina strong extending 100% of tibia; dorsomesal carinae strong at apex tapering towards base but extending 100% of tibia; all except ventral carinae partly covered by setae; mucro medium size to long; tibial corona smooth, without spines; spur clearly visible in lateral view, sparsely covered with setae; mesotarsus 1 shorter and slightly wider than metatarsus 1. Mesosternal process produced, projecting to slightly less than 90° angle from body plane apex feebly curved back towards plane of metasternum; spinasternum posterior to the process produced.

Abdomen. Sternum 1 about as long as remaining sterna. Pygidium punctulate, moderately convex to flat in lateral view, slightly wider than long (length/width ratio mean 0.83), wider at base than apex, not hidden by the elytra, elytra often only reaching pygidium base (elytra cover 0-10%), but at almost 90° angle to elytra and usually only slightly visible in dorsal view.

Genitalia. Median lobe (Fig. 163) slender. Ventral valve long with sides forming a triangle with an acute angle. Internal sac without armature. Lateral lobes (Fig. 164) confluent, not separated, with gemmae, without cleft, apex with vague median notch and line-like sinus. Kingsolver's band absent.

Females.— Similar to males, but maximum thoracic depth slightly larger. Bursa copulatrix without armature (Fig. 162).

Specific Records.—(See list of paratypes.) Host records are from collection labels, spelled exactly as written, and should be verified.

Discussion.—This is probably the "another species" mentioned by Bridwell (1929:159) with a leg similar to *P. bactris* but never described.

The two species most easily confused with *P. sveni* are: *P. thoracicus* which has the same number of apical tubercles (two), the same setae color and the same size, but a wider prothoracic disk compared to length and no sinuated carina on metafemur; and *P. bactris* which has a similar sinuated carina on the metafemur (but absent in females), but is usually larger and has one apical tubercle and golden setae (compared to two apical tubercles and usually greyish-white setae in *P. sveni*).

Pachymerus thoracicus Prevett

Figs. 6, 86, 177-180

Pachymerus thoracicus Prevett 1966b:190; Udayagiri and Wadhi 1989:245.

Pachymerus copernicae Bondar: *in* Zacher 1952:469. **Nomen nudum.**

Pachymerus copernicae Bondar: *in* Silva 1979:347. **Nomen nudum.**

Type Data.—Type locality: Asuncion, Paraguay. Holotype, Asuncion, Paraguay, 1905, Fry; deposited in The Natural History Museum, London (BMNH). No allotype designated.

Distribution .—(Fig. 6).—Specimens examined, 35. Argentina (Buenos Aires, Chaco, Entre Rios, Formosa, Misiones, Tucumán), Brazil (Bahia, Espirito Santo, Mato Grosso do Sul, Rio Grande do Sul), Paraguay (Central).

Diagnosis.—Red brown to dark brown, greyish-white to sometimes pale yellow pubescence only partly covers integument color. Males 8.0-9.5 mm, females 7.8-9.5 mm in length (pronotum-elytra); width of males 4.8-6.0 mm, females 4.4-6.0 mm, maximum thoracic depth of males 3.4-3.7 mm, females 3.3-3.7 mm. Antennal segments 4 not serrate, segment 5-10 serrate, slightly longer than wide. Eyes distant. Disk of pronotum clearly wider than long (length/width ratio mean 0.66). Metafemur less than twice as long as wide (length/width ratio mean 1.74); pecten curved, with 11-14 denticles, denticle 1 acuminate and longer, two apical tubercles; prepectenal ridge shorter than pecten, without spines. Metatibia with two strong ventral carinae, middle ventral carina uniform (not crooked), outer ventral carina obsolete. Pygidium wider than long (length/width ratio mean 0.75).

Males.—Integument. Hirsute, base of each seta in a minute puncture (therefore minutely punctulate where setae have been removed). Gula, part of ventral side of gena, apical end of proepimeron (with golden setae lining the margin), metacoxa near trochanter, and part of mesal side of metafemur glabrous. *Color.* Body and appendages red brown to dark brown.

Vestiture. Setae often lost on part of the body, possibly due to rubbing. Dorsal and ventral body surfaces with greyish-white to pale yellow, fine texture, short, recumbent, moderately dense to sparse, uniform setae; antenna with short greyish-white, uniform, sparse setae and longer golden, sparse, irregular setae; elytron surface moderately hirsute; protibia and mesotibia with coarse, golden, moderately dense to dense setae apically; metatibia lacking golden setae, except a few golden setae inside apex of mucro; ventral ridge of metafemur with long, greyish-white to pale yellow setae sparsely covering pecten; tarsomere 1 with moderately dense, golden setae, ventral side of tarsomere 3 with very dense, coarse, golden setae; pygidium about as hirsute as elytron, setae longer.

Head. Shorter than pronotum; frons and vertex with a median, often prominent, partly glabrous carina, carina at vertex not interrupted by a weak depression (Fig. 96); ocular sinus short; on dorsal side eyes distant; postocular lobe short but distinct. Antenna shorter than elytra, antennal segment 4 not serrate, segments 5-10 serrate longer than wide. Gena very long; sides of submentum strongly converging triangularly between eyes, on ventral side eyes distant.

Prothorax. Disk distinctly wider than long (length width ratio mean 0.66); sides and base with strong, impressed, marginal line, anterior margin emarginate, marginal line tapering toward middle, medially line weak or absent; angles rounded, visible in dorsal view; medial dorsal surface convex, flattened posteriorly, densely punctate; sides depressed, sharply depressed towards apex, arcuate, feebly narrowed to apex from slightly more than middle of side; angles of lateral margin at base feebly produced or rounded, angle more than 90°; posterior margin arcuate, produced medially; strong lateral prothoracic carina complete, extending from base to apex. Protarsus 1 shorter, about as wide as metatarsus 1. Prosternum completely separating procoxae, apex of prosternal process narrow.

Mesothorax and Metathorax. Scutellum small, subquadrate. Elytron with dorsal surface almost flat between humerus and mesal margin, depressed laterally and apically; humerus scabrous, partly covered with setae; striae punctate. Metafemur incrassate, slightly less than twice as long as wide (length/width ratio mean 1.74), expanded from base, maximum width closer to base; ventral side with a pecten, sparsely covered with long, greyish-white to pale yellow setae, armed with 11 or 14 denticles; denticle 1 long, acuminate, closer to femoral base than to apex; following denticles smaller in size, sparsely covered by setae on lateral side, the last denticle usually larger than preceding, tuberculate; two apical tubercles; when leg flexed, tibia positioned on mesal side of pecten; prepectenal ridge much shorter than pecten, covered with setae, without spines; lateral side with small punctures, usually feebly visible under setae. Metatibia evenly arcuate (angle >90°); two very strong ventral carinae, inner ventral carina strong fusing with middle carinae at apex of mucro, middle ventral carina strong, uniform (not crooked), with a tubercle near base, and a very short sulcus distal to tubercle, furrow between carinae, outer carina obsolete; lateral carina strong extending 100% of tibia, distance to dorsolateral carina measured at the base of mucro, about the same as if measured from 3/4 length of tibia (75% of distance from base of tibia); dorsolateral carinae strong at apex tapering fast towards base extending 90-95% of tibia; mesal carina strong extending 100% of tibia;

dorsomesal carinae strong at apex tapering slowly towards base but extending 100% of tibia; carinae usually not covered by setae; mucro medium size; tibial corona smooth, without spines; spur clearly visible in lateral view, usually not covered with setae; mesotarsus 1 shorter, about the same width as metatarsus 1. Mesosternal process slanting, projecting to less than 90° angle from body plane, apex feebly curved back towards plane of metasternum; spinasternum posterior to the process only vaguely produced.

Abdomen. Sternum 1 about as long as remaining sterna. Pygidium punctulate, convex in lateral view, wider than long (length width/ratio 0.75), wider at base than apex, partly hidden by the elytra, elytra cover 20-60% of pygidium length from base, but at almost 90° angle to elytra and usually not visible in dorsal view.

Genitalia. Median lobe (Fig. 179) slender. Ventral valve long with sides forming a triangle with an acute angle. Internal sac without armature. Lateral lobes (Fig. 180) confluent, not separated, with gemmae, without cleft, apex with vague median notch and line-like sinus. Kingsolver's band absent.

Females.— Similar to males, but maximum thoracic depth slightly larger. Bursa copulatrix without armature (Fig. 178).

Specific Records.—Host records are from collection labels, spelled exactly as written, and should be verified. Argentina: Buenos Aires, 10.?.1907, C. Bruch (BR); Chaco, El Zapallar, 9.VI.48, R. Golbach (FML); Entre Rios, Federal, Daguerre (BR); Formosa, Gran Guardia, J. Foerster (CNC), Misiones, Bemberg, 12-291945, Hayward, Willink & Goldbach (FML); Eldorado, XI.30.1964, A. Kovacs (AMNH); Tucumán, Las Puestos, ex seed *Copernicia australis* Becc., 8.IV.1967 (FML). Brazil: Bahia, Fruits of *Copernicia orientalis*, G. Bondar (BMNH); Espirito Santo, Colatina (BMNH); Mato Grosso do Sul, Corumbá, ex fruits *Copernicia* sp., XI.17 (USNM); Rio Grande do Sul, (USNM). Paraguay: Central, Asunción, 1905, Fry, *holotype*, (BMNH); Asunción, 1905, Fry, *paratype*, (BMNH); quarantine Miami, in palm seed, 6.X.53 (USNM); 28.III.1956, *paratype*, (USNM).

Discussion.—The two species most easily confused with *P. thoracicus* are: *P. sveni* which has the same number of apical tubercles (two), the same setae color and the same size, but a narrower prothoracic disk compared to length and a sinuated carina on metafemur; and small specimens of *P. nucleorum* which have two apical tubercles, eyes on the dorsal side distant, and greyish-white setae like *P. sveni*, but a large tooth or sulcus at the distal end of the pecten (absent in *P. thoracicus*), and a much longer prothoracic disk compared to width (much wider than long in *P. thoracicus*). Usually *P. nucleorum* is much larger in size and cannot be confused with the much smaller *P. thoracicus*.

Beetles collected in 1907 by C. Bruch were identified as *Pachymerus gleditsiae*. This identification was discussed by Bridwell (1929:156). Bridwell stated correctly that he did not believe these specimens were *Caryobruchus gleditsiae*. These beetles are specimens of *Pachymerus thoracicus*.

COMPARISONS OF SPECIES IN *PACHYMERUS*

Study of the external characters and especially the gemmae of the lateral lobes of the male genitalia of *Butiobruchus bridwelli* indicate that this species should be placed in *Pachymerus*. It is best separated from other species of *Pachymerus* by the weak almost non-apparent pecten, the absence of a large first pectenal denticle, the absence of a tibial sulcus, and the sides of the submentum between the eyes being almost parallel. The latter character is not always distinct and it is sometimes hard to distinguish the feebly triangular sides of some species of *Pachymerus*. However the gena is usually longer in other species of *Pachymerus* compared to *P. bridwelli*.

The best characters to separate species of *Pachymerus* are the apical tubercles on the metafemur and the distance between the eyes on the dorsal side. *Pachymerus bactris* and *P. nucleorum* have one apical denticle, and sometimes also *P. cardo*. All other species have two apical tubercles. Sometimes *P. cardo* has three apical tubercles. *Pachymerus bactris* and *P. sveni* have eyes approximate (close together), *P. bridwelli*, *P. nucleorum* and *P. thoracicus* have eyes distant (far apart), while the distance between the eyes are intermediate on *P. abruptestriatus* and on *P. cardo*. The color of the setae is also a good character to separate some species. The golden setae contrasting with surrounding strial intervals along mesal margin of elytron, often appearing as a light colored band, in *P. bactris* cannot be confused. The coarse pale yellow pubescence on *P. abruptestriatus* is also very distinctive. The best character to identify *P. sveni* is the produced bend and sinuated carina on the metafemur. A similar structure also exists on the metafemur of male *P. bactris*, but the length of the leg segment is shorter in *P. sveni*. For morphometrical comparisons see Table 2. Note the longer pygidium of *P. bridwelli* and the wider pronotal disk of *P. thoracicus*.

SYSTEMATIC RELATIONSHIPS

The Bruchidae are closely related to the Chrysomelidae. Some researchers, primarily those of the Chrysomelidae (e.g. Monros 1959; Lawrence and Newton 1982; Schmitt 1985; 1989, 1990), believe that the seed beetles should be included as a subfamily in the Chrysomelidae, and some even as a tribe in the subfamily Sagrinae (e.g. Monros 1959). Others believe that the Bruchidae is a valid family, but if so the large leaf beetle family should be split into smaller families (Lawrence and Newton 1982), to conform with the definition of a monophyletic group.

Schmitt (1989) stated that the Bruchidae should be included as a subfamily in the Chrysomelidae. However, the bruchids he studied and used to find both synapomorphies and symplesiomorphies were *Acanthoscelides obtectus*, *Callosobruchus maculatus*, *Gibbobruchus mimus*, and *Spermophagus sericeus*. We believe these bruchids are all so called advanced species. He used characters from these groups to separate bruchids and other groups from Monrós (1985) "Crioceriformes". He stated that "similarities between these groups [Megalopodinae, Orsodacninae, and Bruchidae] and certain "Crioceriformes" can be shown with, e.g., pronotum without side margin, emarginated eyes, and tegminal parameres," which he stated are plesiomorphies. We believe these are apomorphic character states and that Schmitt should have studied the Pachymerini, and possibly also *Amblycerus* Thunberg, to find better characters since they are primitive groups.

Beetles in the Sagrinae are usually considered to be the closest relatives of the Pachymerinae (Crowson 1960; Monros 1959; Lawrence and Newton 1982; Kingsolver, pers. comm.). The Sagrinae genera *Carpophagus* and *Duboulaya* are considered primitive beetles and could have had a possible common ancestor with a primitive bruchid ancestor, while *Sagra* is an advanced group and not closely related to the Bruchidae (Monros 1959). *Sagra* has bright metallic colors, usually green, while the primitive leaf beetles are usually colored brown and have a general elongated appearance similar to the most primitive pachymerine tribe, the Pachymerini. They also have characters in common such as lateral carinae (Figs. 43, 44) and a marginal line on the pronotum (Fig. 12). These do not occur in other Chrysomelid groups (Monros 1959).

Nilsson (1992) further discussed several aspects of systematic relationships, cladistics, biogeographical history, morphological terminology, nomenclature and problems with type material, not included here.

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Only the New World tribe Pachymerini is revised. *Caryedon serratus* (Olivier) and its synonyms, in the Old World tribe Caryedini, are excluded from the list, even though this species now is established in the New World. The fossil genus *Oligobruchus* Kingsolver is also excluded from the list, but it is mentioned briefly in the text (see TAXONOMIC HISTORY). It is also included in the distribution map (Fig. 1).

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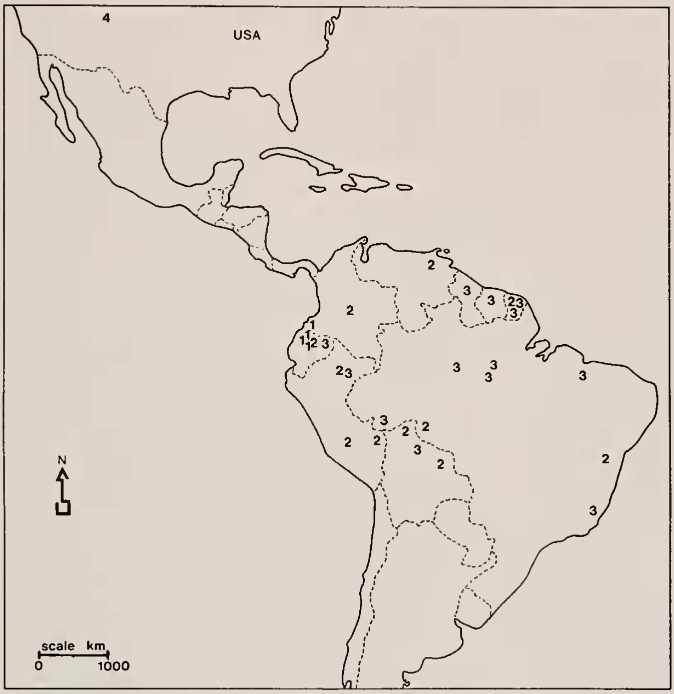
Table 1. Plant families fed upon by bruchid larvae.

Acanthaceae
Anacardiaceae
Apiacea
Arecaceae
Asteraceae
Bignoniaceae
Bixaceae
Bombacaceae
Boraginaceae
Cistaceae
Cochlospermaceae
Combretaceae
Convolvulaceae
Dioscoreaceae
Ebenaceae
Euphorbiaceae
Fabaceae
Lauraceae
Lythraceae
Malpighiaceae
Malvaceae
Myrtaceae
Nyctaginaceae
Nymphaceae
Ochnaceae
Onagraceae
Pandanaceae
Rhamnaceae
Sterculiaceae
Tiliaceae
Verbenaceae
Vitaceae
Zygophyllaceae

Table 2. Taxonomically important length/width ratio means of Pachymerini species, males (n=10). 1, pronotum disk; 2, metafemur; 3, pygidium.

Genus Species	1	2	3
Caryoborus			
chiriquensis	0.79	1.95	1.16
gracilis	0.81	2.07	1.32
serripes	0.81	2.02	1.11
Caryobruchus			
curvipes	0.73	1.92	0.70
gleditsiae	0.69	1.94	0.74
marieae	0.72	1.79	1.00
maya	0.68	1.90	0.89
ubidus	0.72	1.91	0.70
veseyi	0.78	2.60	0.76
Speciomerus			
giganteus	0.84	2.13	1.02
revoili	0.74	2.05	0.79
rubrofemoralis	0.80	2.05	0.96
ruficornis	0.81	2.08	0.92
Pachymerus			
abruptestriatus	0.69	1.86	0.74
bactris	0.70	1.97	1.00
bridwelli	0.78	1.95	1.10
cardo	0.72	1.65	1.00
nucleorum	0.80	1.81	0.89
sveni	0.71	1.74	0.83
thoracicus	0.66	1.74	0.75



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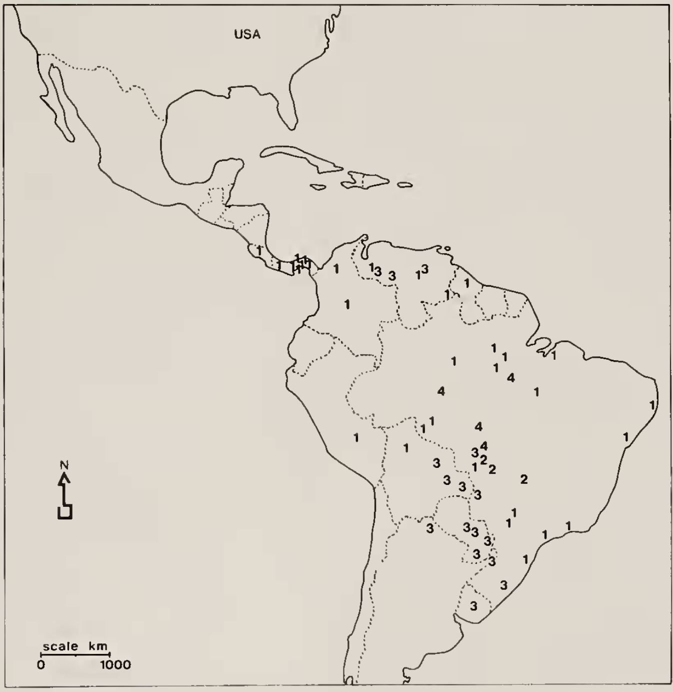

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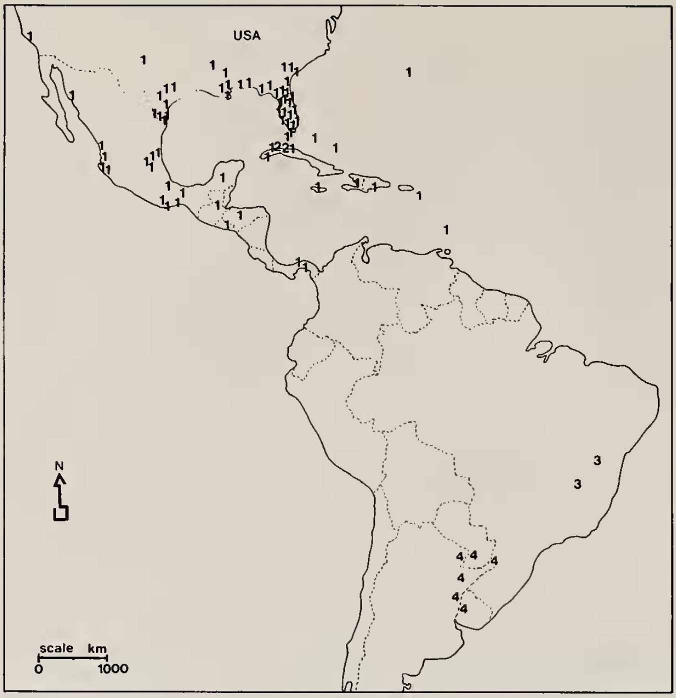
Figs. 1-2. 1, Geographical distribution of (**1**) *Caryoborus chiriquensis* Sharp, (**2**) *C. gracilis* Nilsson, (**3**) *C. serripes* (Sturm), and (**4**) *Oligobruchus* Kingsolver, fossil (Florissant formation, Oligocene). 2, Geographical distribution of (**1**) *Speciomerus giganteus* (Chevrolat), (**2**) *S. revoili* (Pic), (**3**) *S. rubrofemoralis* (Pic), and (**4**) *S. ruficornis* (Germar).

3



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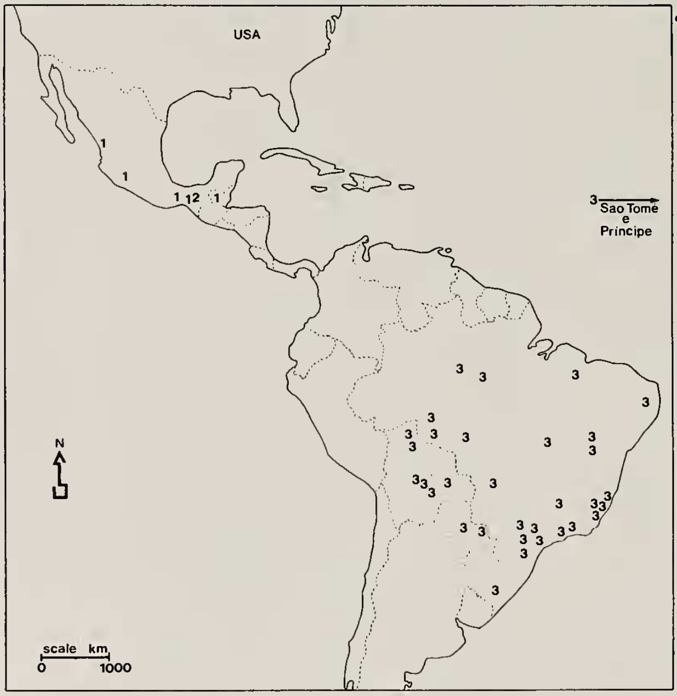
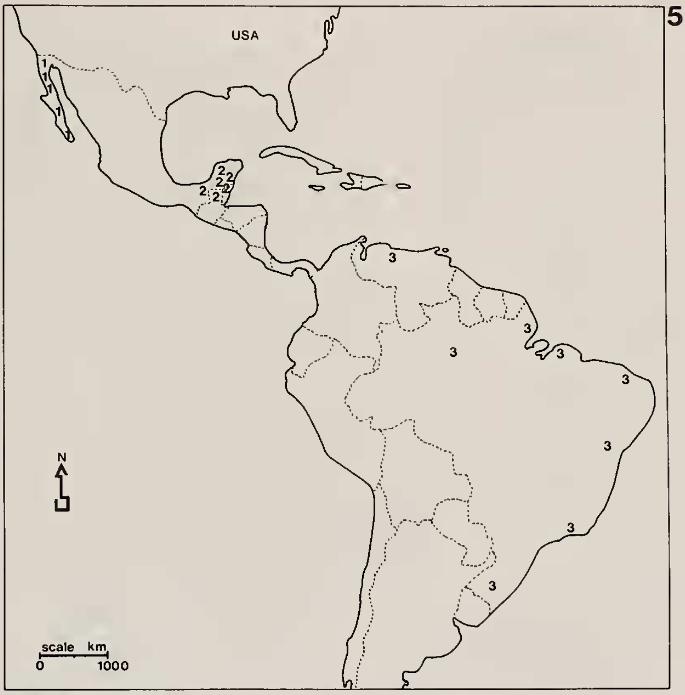


Figs. 3-4. 3, Geographical distribution of (1) *Caryobruchus gleditsiae* (Johansson and Linné), (2) *C. marieae* Nilsson and Johnson, (3) *Pachymerus abruptestriatus* (Gyllenhal *in* Schönherr), and (4) *P. bridwelli* (Prevett). 4, Geographical distribution of (1) *Caryobruchus curvipes* (Latreille), (2) *C. rubidus* (Chevrolat), and (3) *Pachymerus nucleorum* (Fabricius).



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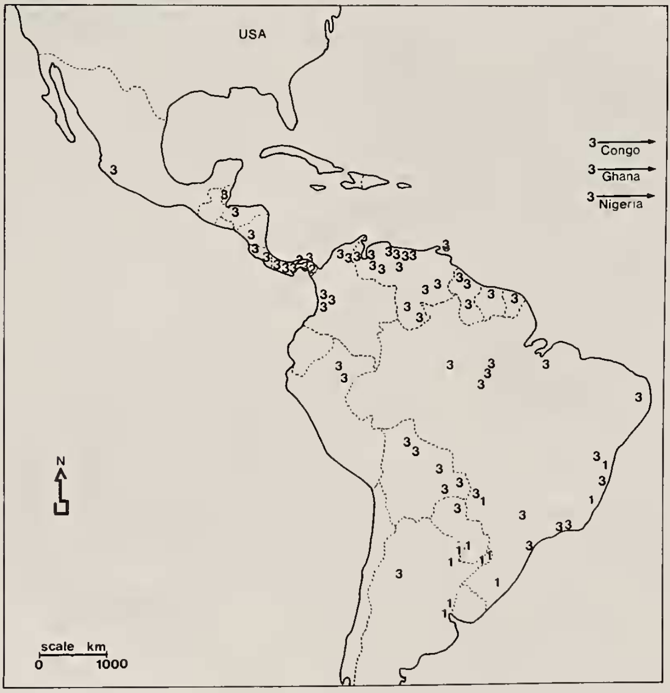
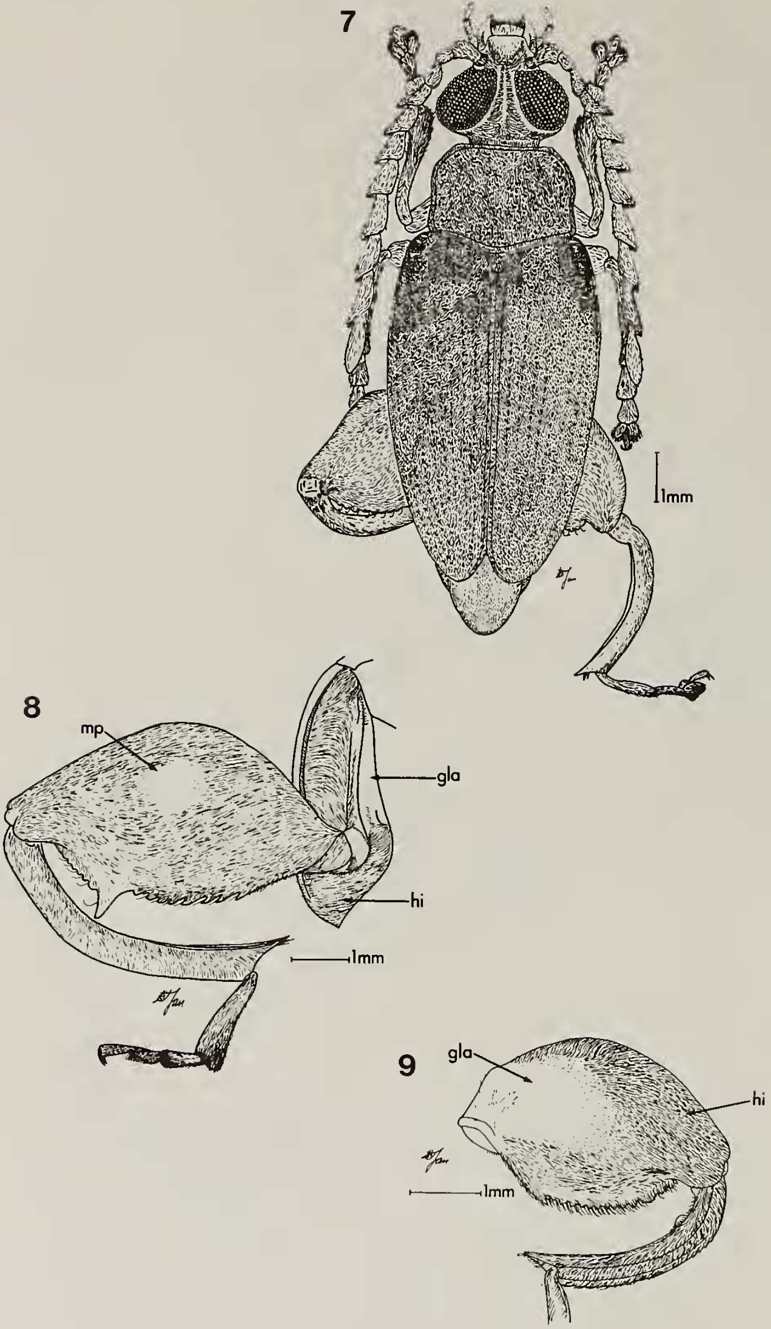
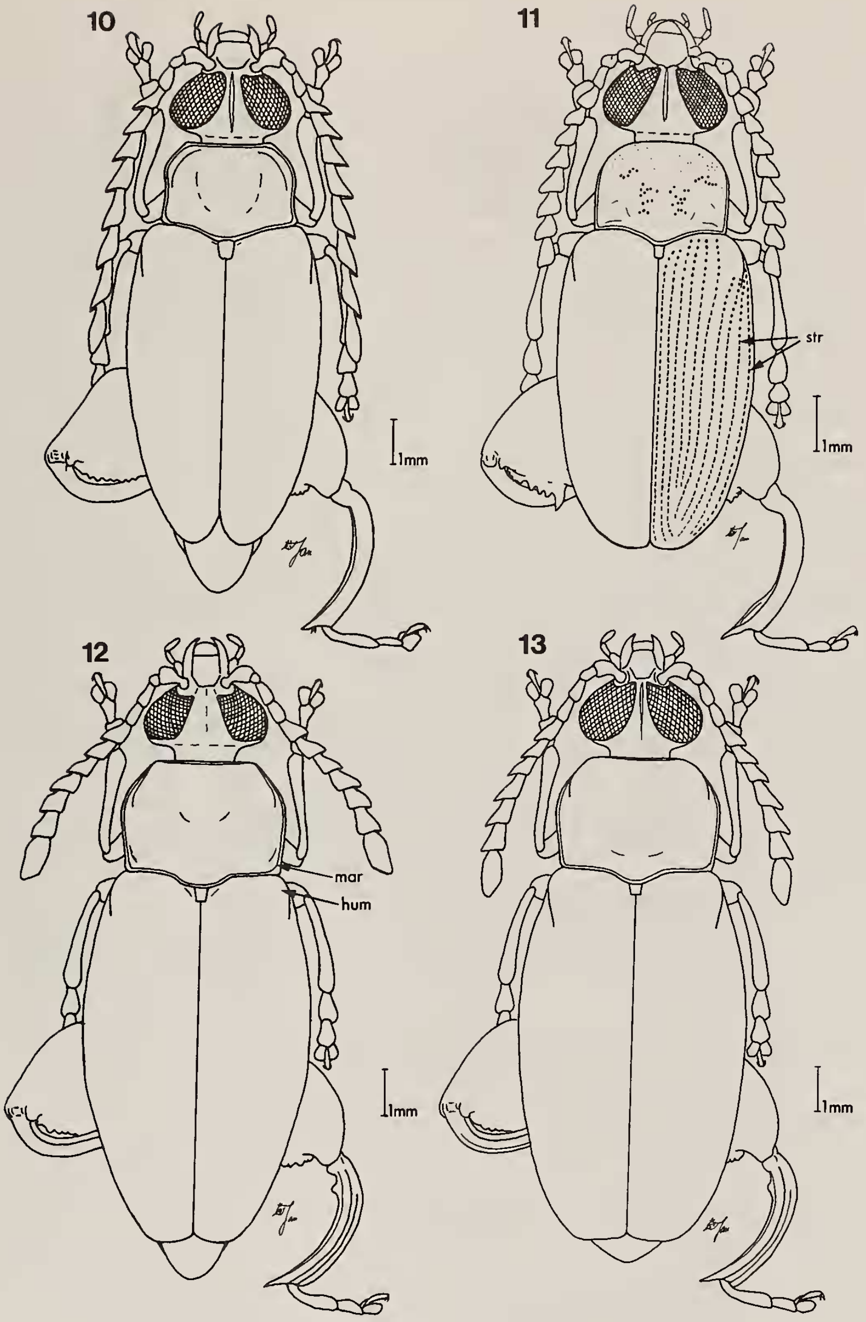


6

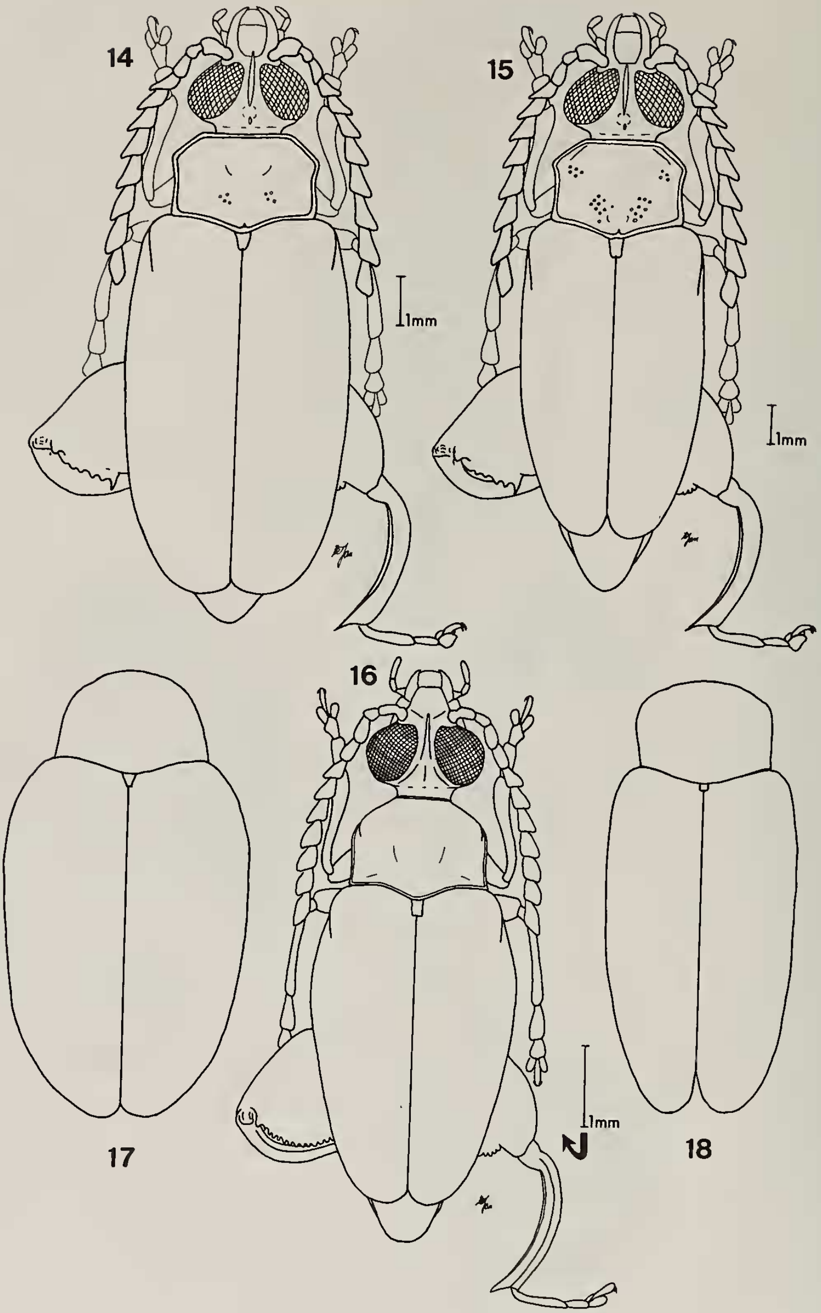
Figs. 5-6. 5, Geographical distribution of (1) *Caryobruchus veseyi* (Horn), (2) *C. maya* Nilsson, and (3) *Pachymerus sveni* Nilsson. 6, Geographical distribution of (1) *P. thoracicus* Prevett, (2) *P. bactris* (Linné *in* Jacquin), and (3) *P. cardo* (Fåhraeus *in* Schönherr).



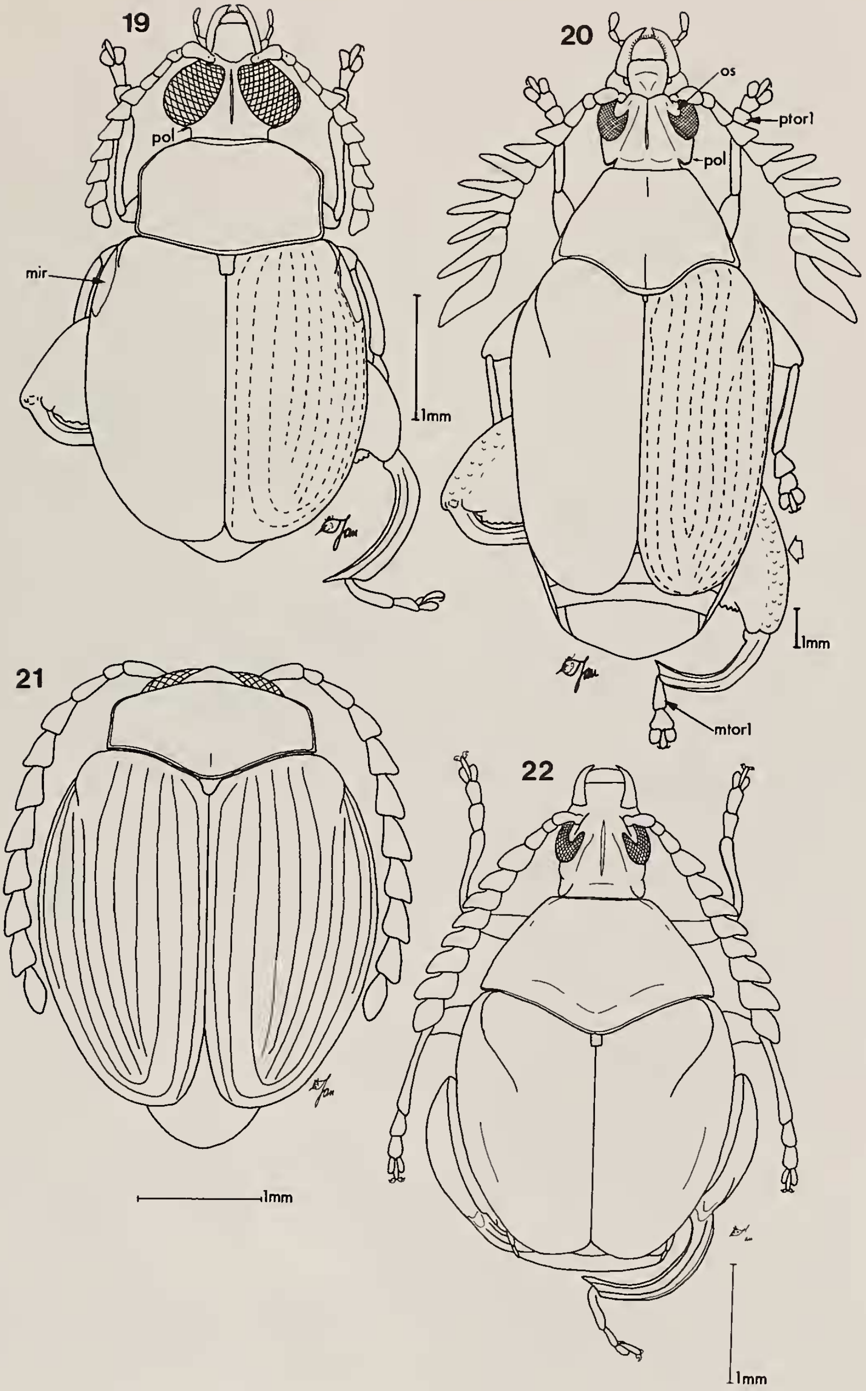
Figs. 7-9. 7, *Caryoborus serripes* (Sturm), habitus with setae, dorsal view. 8, *Speciomerus giganteus* (Chevrolat), hind leg with setae, lateral view. 9, *Pachymerus sveni* Nilsson, hind leg with setae, mesal view. Abbreviations: gla = glabrous, mp = micropunctulate (due to loss of setae), hi = hirsute.



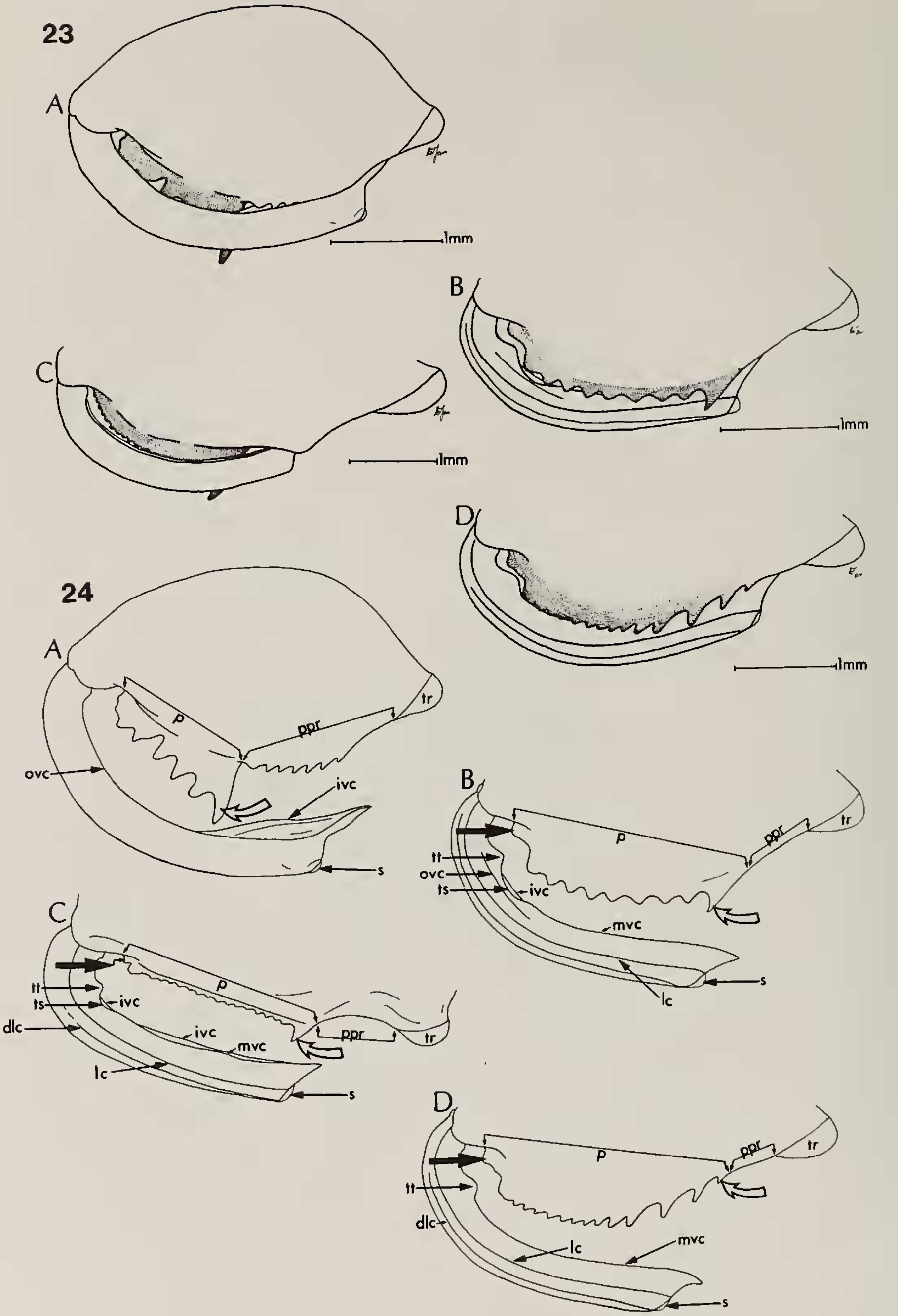
Figs. 10-13. Adult pachymerine bruchids, dorsal view. 10, *Caryoborus serripes* (Sturm). 11, *Caryobruchus marieae* Nilsson and Johnson. 12, *Pachymerus bridwelli* (Prevett). 13, *P. nucleorum* (Fabricius). Abbreviations: mar = marginal line on pronotum disk.



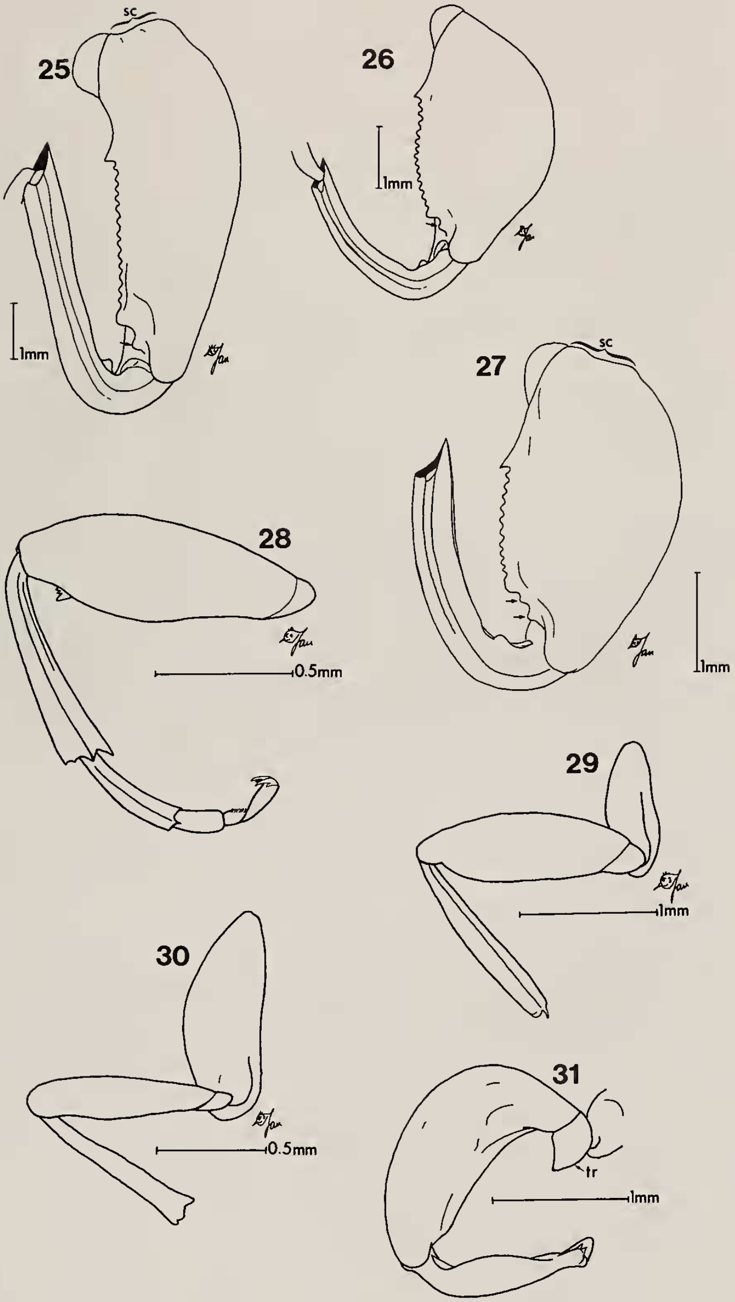
Figs. 14-18. Adult pachymerine bruchids, dorsal view. 14, *Speciomerus revoili* (Pic). 15, *S. giganteus* (Chevrolat). 16, *Caryedon serratus* (Olivier). 17, *Mimocaryedon freyi* Decelle. 18, *Caryotrypes pandani* (Blanchard).



Figs. 19-22. Adult pachymerine bruchids, dorsal view. 19, *Afroredon africanus* Decelle. 20, *Caryopemon giganteus* Pic. 21. *Exoctenophorus deflexicollis* Decelle. 22. *Diegobruchus rubroguttatus* (Fairmaire). Abbreviations: mir = miroir (glabrous field; only in females), oc = ocular sinus, pol = post ocular lobe, ptar1 = protarsus segment 1. Large open arrow = granulated dorsal side of metafemur on *Caryopemon*.



Figs. 23-24. 23, Hindleg, completely flexed: A, *Caryobruchus marieae* Nilsson and Johnson; B, *Pachymerus sveni* Nilsson; C, *Caryoborus serripes* (Sturm); D, *Pachymerus bridwelli* (Prevett). Shaded area = pecten. 24, Hindleg, partly extended: A, *C. marieae*; B, *P. sveni*; C, *P. bactris* (Linné), male; D, *P. bridwelli*. Abbreviations: dlc = dorsolateral carina, ivc = inner ventral carina, lc = lateral carina, mvc = middle ventral carina, ovc = outer ventral carina, p = pecten, ppr = prepectenal ridge, s = spur, tr = trochanter, ts = tibial sulcus, tt = tibial tubercle, large black arrow = apical tubercles on pecten. Large white arrow = denticle 1 on pecten.



Figs. 25-31. Hind legs of Bruchidae. 25, *Pachymerus bactris* (Linné), male. 26, *P. bactris*, female. 27, *P. sveni* Nilsson. 28, *Acanthoscelides siemensi* Johnson. 29, *Eubaptus semiruber* (Pic). 30, *Kytorhinus prolixus* (Fall). 31, *Rhaebus* Fischer. Abbreviations: sc = sinuated carina, tr = trochanter. Small arrows = apical tubercles.

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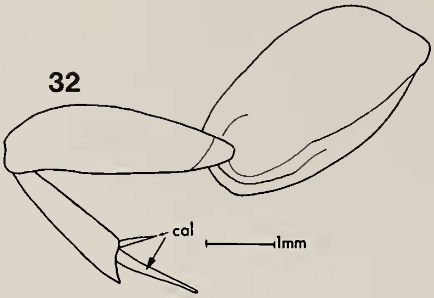

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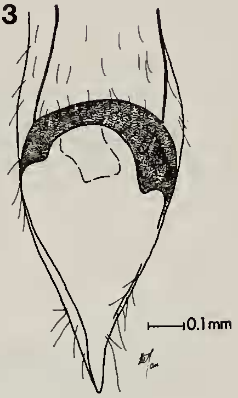

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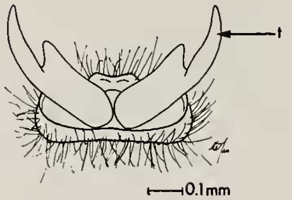

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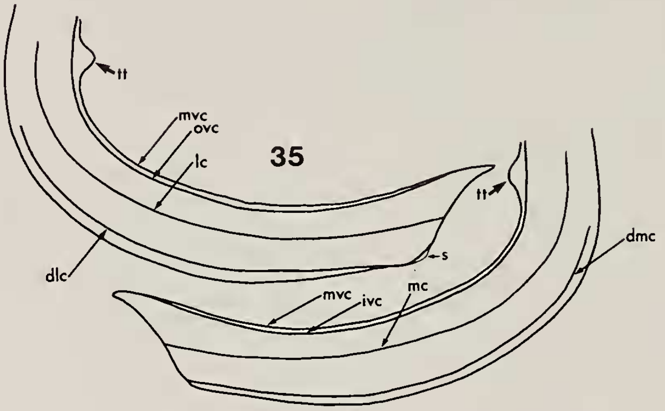
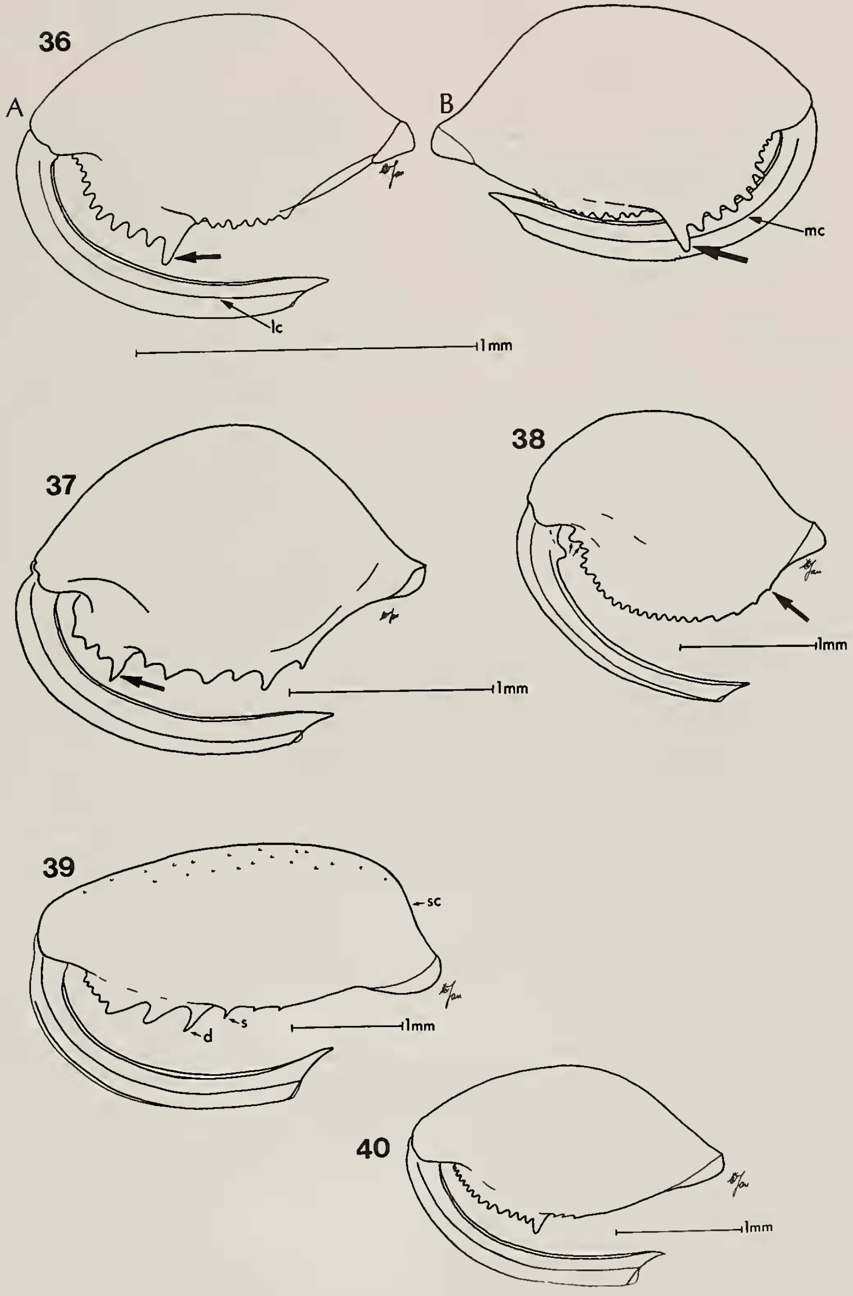
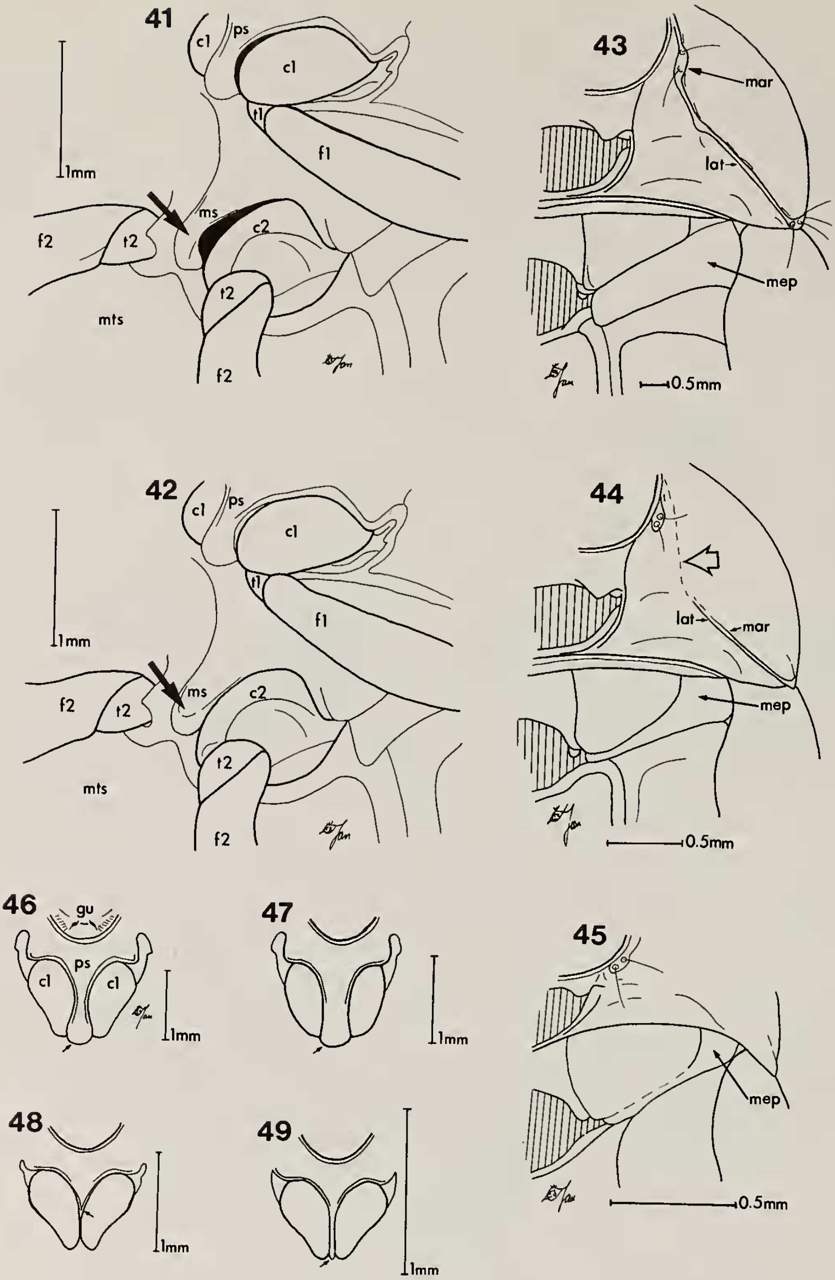


Figs. 32-35. 32, Hind leg of *Amblycerus* Thunberg. 33, Mucro of right tibia of *Pachymerus bactris* (Linné), dorsal view with spur (shaded area). 34, Last tarsomere of 1st leg, front view, of *Speciomerus giganteus* (Chevrolat). 35, Tibial carinae of an imaginary primitive Pachymerinae. Abbreviation: cal = calcaria, dlc = dorsolateral carina, dmc = dorsomesal carina, ivc = inner ventral carina, lc = lateral carina, mc = mesal carina, mvc = middle ventral carina, ovc = outer ventral carina, s = spur, t = tarsal claw, tt = tibial tubercle.



Figs. 36-40. Hind legs of Old World Pachymerinae: 36, *Afroredon africanus* Decelle: A, lateral view; B, mesal view; 37, *Diegobruchus rubroguttatus* (Fairmaire); 38, *Exoctenophorus deflexicollis* Decelle; 39, *Caryopemon giganteus* Pic; 40, *Caryedon serratus* (Olivier). Abbreviations: d = denticle (on pecten), lc = lateral carina, mc = mesal carina, s = spine (on prepectenal ridge), si = sinuated carina. Large arrow = denticle 1 on pecten, small arrows = apical tubercles.



Figs. 41-49. 41, *Caryoborus serripes* (Sturm), ventral side showing mesosternal process. 42, *C. chiriquensis* Sharp, ventral side showing mesosternal process. 43, *Speciomerus revoili* (Pic), ventral and lateral side showing mesoepimeral plate and lateral carina on pronotum. 44, *Caryedon serratus* (Olivier), mesoepimeral plate and lateral carina on pronotum. 45, *Acanthoscelides macrophthalmus* (Schaeffer), mesoepimeral plate and lateral carina on pronotum. 46, *Pachymerus bactris* (Linné), prosternal process. 47, *P. abruptestriatus* (Gyllenhal), prosternal process. 48, *C. serratus*, prosternal process. 49, *Afroredon africanus* Decelle, prosternal process. Abbreviations: c1 = coxae legpair 1, c2 = coxae legpair 2, f1 = femur legpair 1, f2 = femur legpair 2, gu = gula, lat = lateral prothoracic carina, mar = marginal line, mep = mesoepimeral plate, ms = mesosternum, mts = metasternum, ps = prosternum, t1 = trochanter legpair 1, t2 = trochanter legpair 2. Large filled arrow = mesosternal process, large open arrow = incomplete carina on pronotum of *C. serratus*, small arrow = prosternal process.

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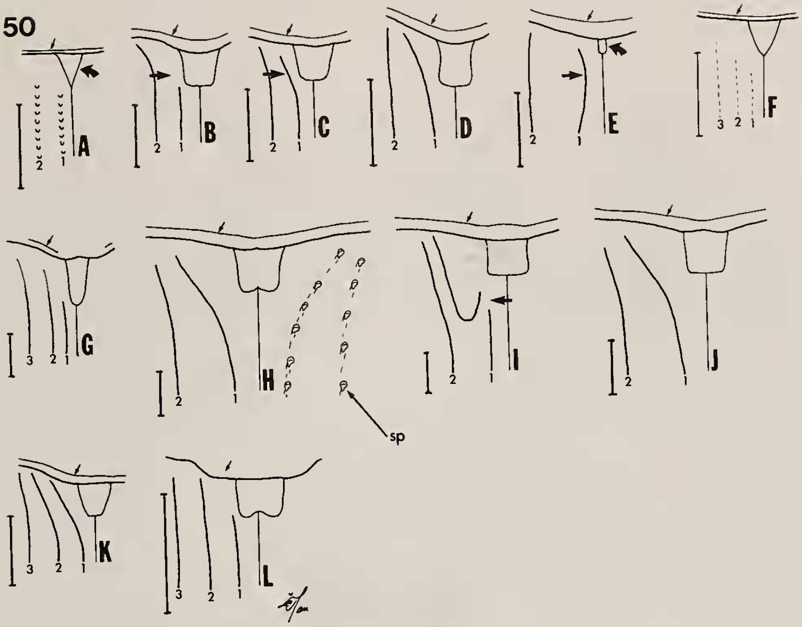

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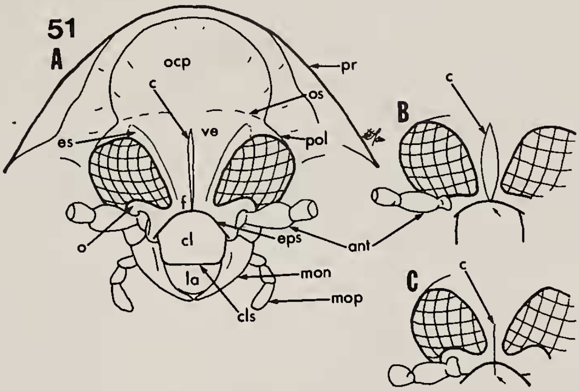

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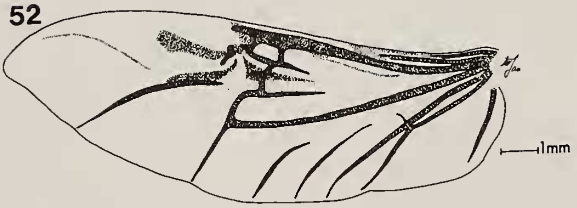
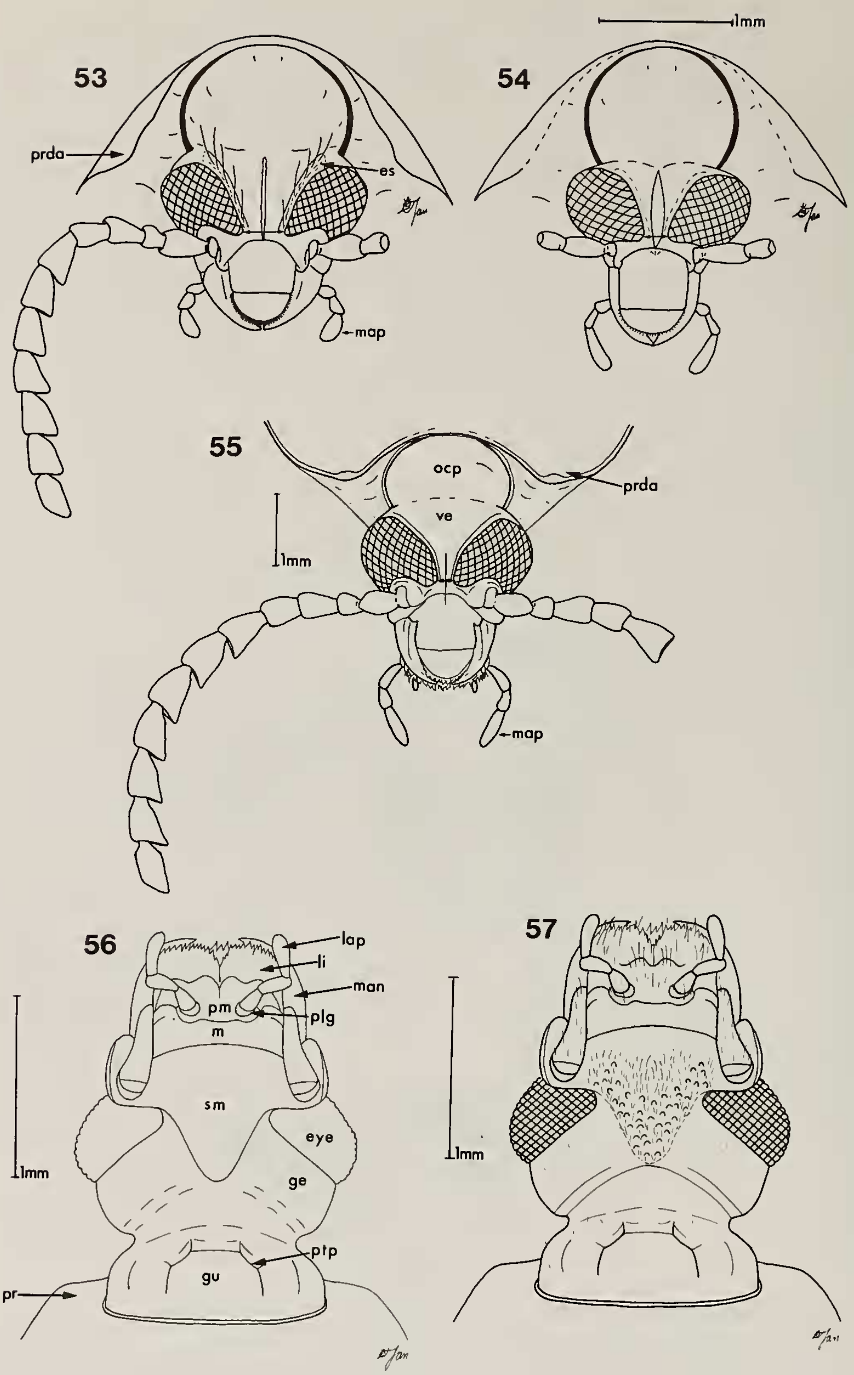


Figs. 50-52. 50, Scutellum and strial patterns at base of the elytra: A, *Rhaebus* Fischer sp.; B, *Caryedon serratus* (Olivier); C, *Afroredon africanus* Decelle; D, *Diegobruchus rubroguttatus* (Fairmaire); E, *Caryopemon giganteus* Pic; F, *Eubaptus semiruber* (Pic); G, *Amblycerus acapulcensis* Kingsolver; H, *Speciomerus revoili* (Pic); I, *Pachymerus nucleorum* (Fabricius); J, *Caryobruchus gleditsiae* (Johansson and Linné); K, *Exoctenophorus deflexicollis* Decelle; L, *Stator beali* Johnson. All scale lines = 0.5mm. Numbers indicate striae. Small arrow = presence or absence of marginal line (note remnant lines on *Amblycerus acapulcensis*), large straight arrow = special stria character, large bent arrow = special scutellum character, sp = strial puncture. 51, Head of Pachymerinae beetles: A, *P. nucleorum*; B, *C. serratus*; C, *P. bactris* (Linné). Note size difference between species of the carina on frons and vertex. 52, Left wing of *P. bactris*. Abbreviations: ant = antenna, c = carina on frons and vertex (interocular carina), cl = clypeus, cls = clypeolabral suture, eps = epistomal suture, es = eye supercilium, f = frons, la = labrum, man = mandible, map = maxillary palp, o = ocular sinus, ocp = occiput, os = occipital sulcus, pol = postocular lobe, pr = pronotum, ve = vertex.



Figs. 53-57. 53-55, Frontal view of head (Figs. 53 and 54 at 90° angle to pronotum, Fig. 55 at 45° angle to pronotum): 53, *Pachymerus nucleorum* (Fabricius), with eyes distant; 54, *Caryedon serratus* (Olivier), with intermediate distance between eyes; 55, *P. bactris* (Linné), with eyes approximate. 56 - 57, Ventral side of head of *Caryobruchus gleditsiae* (Johansson and Linné). Abbreviations: es = eye supercilium, eye = compound eye, ge = gena, gu = gula, lap = labial palp, li = ligula, m = mentum, man = mandible, map = maxillary palp, ocp = occiput, plg = palpiger, pm = prementum, pr = pronotum, prda = anterior part of the pronotum disk, ptp = posterior tentorial pit, sm = submentum, ve = vertex.

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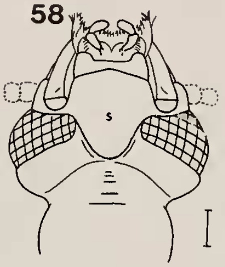

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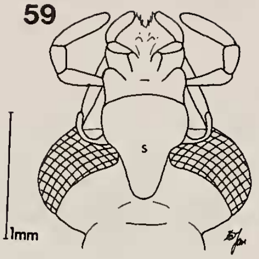

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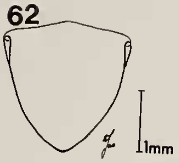

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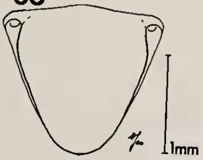

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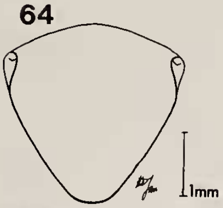

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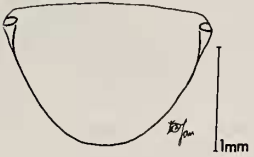

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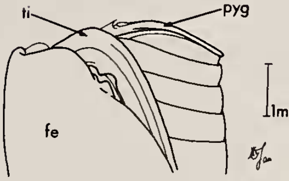

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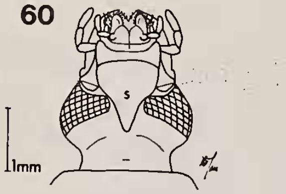

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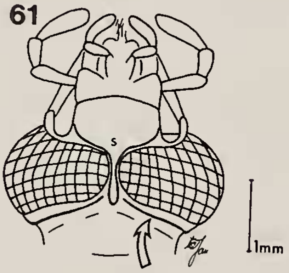

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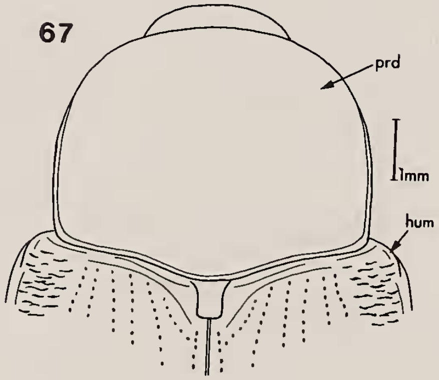
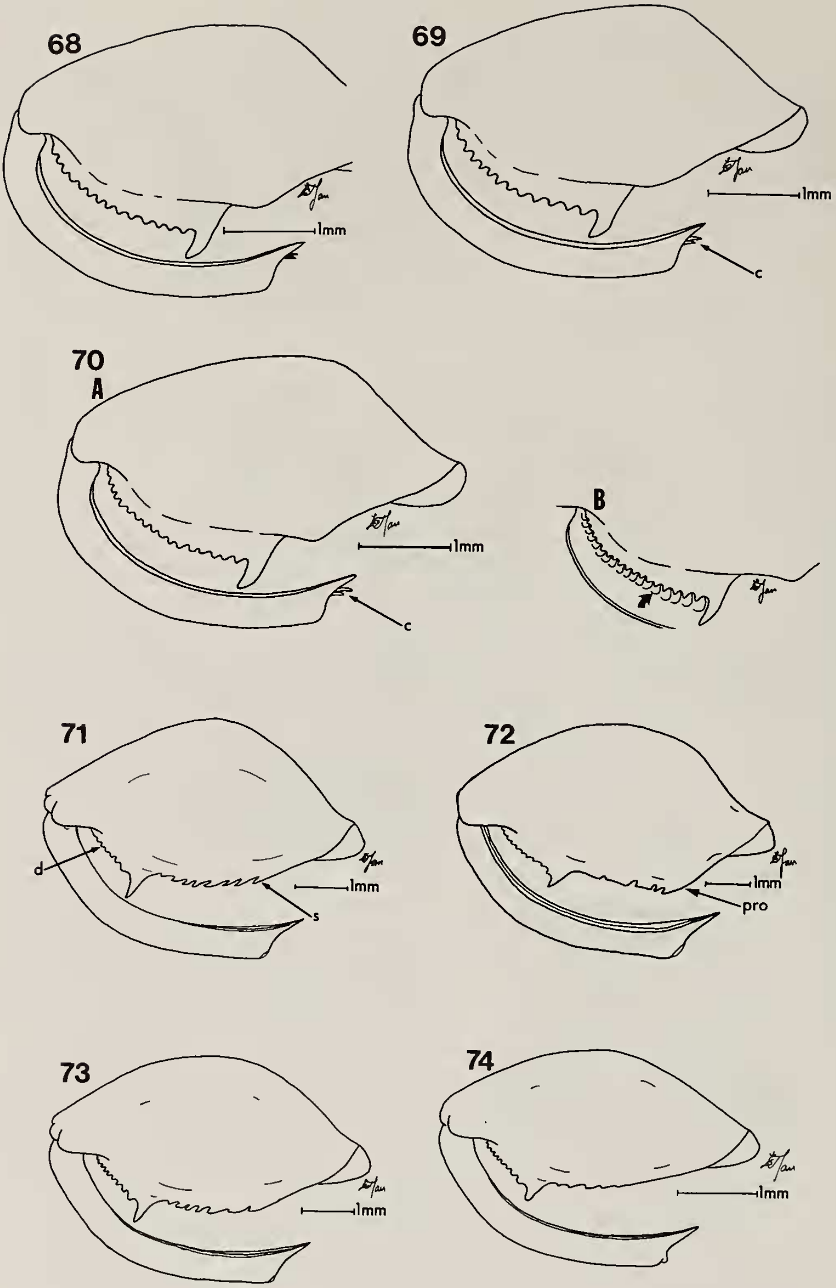
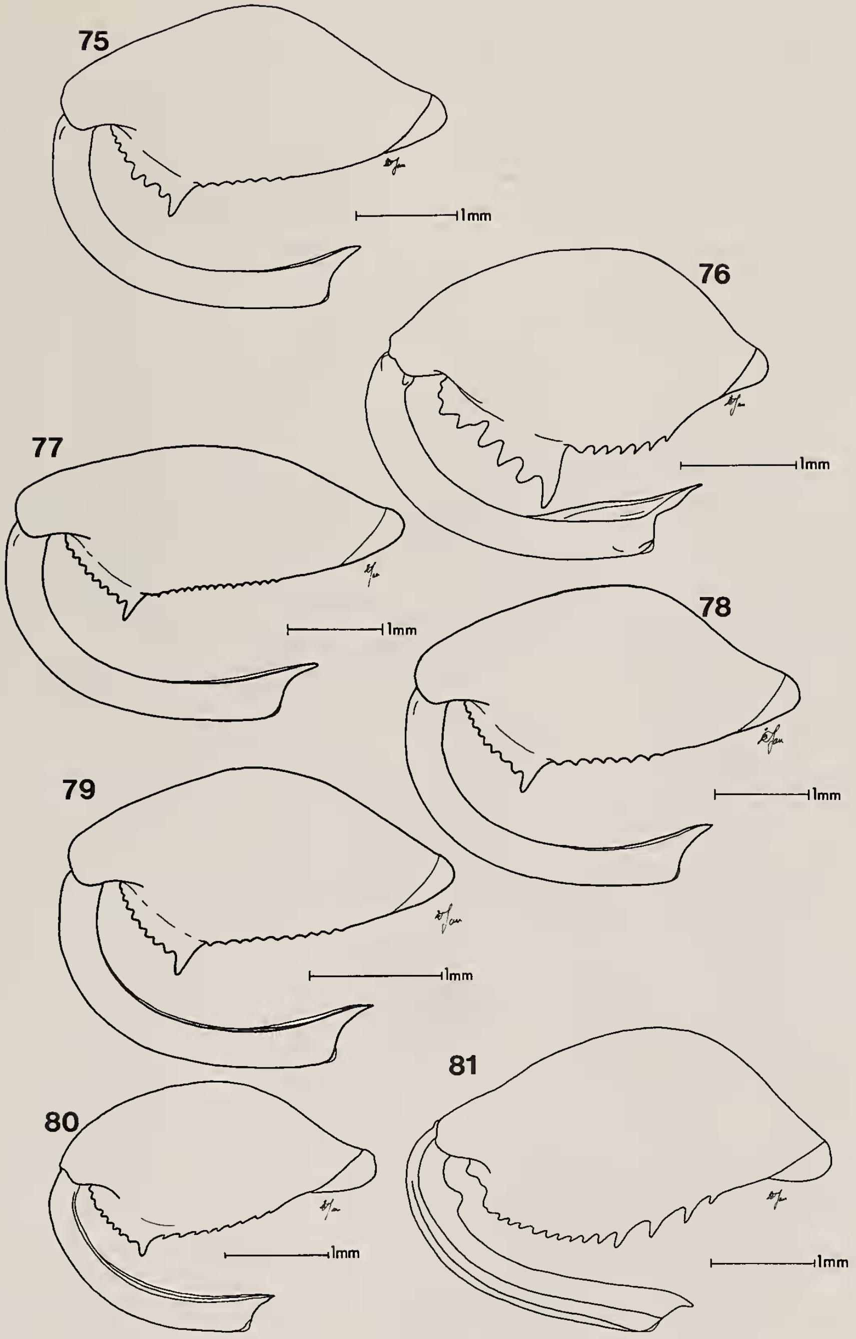


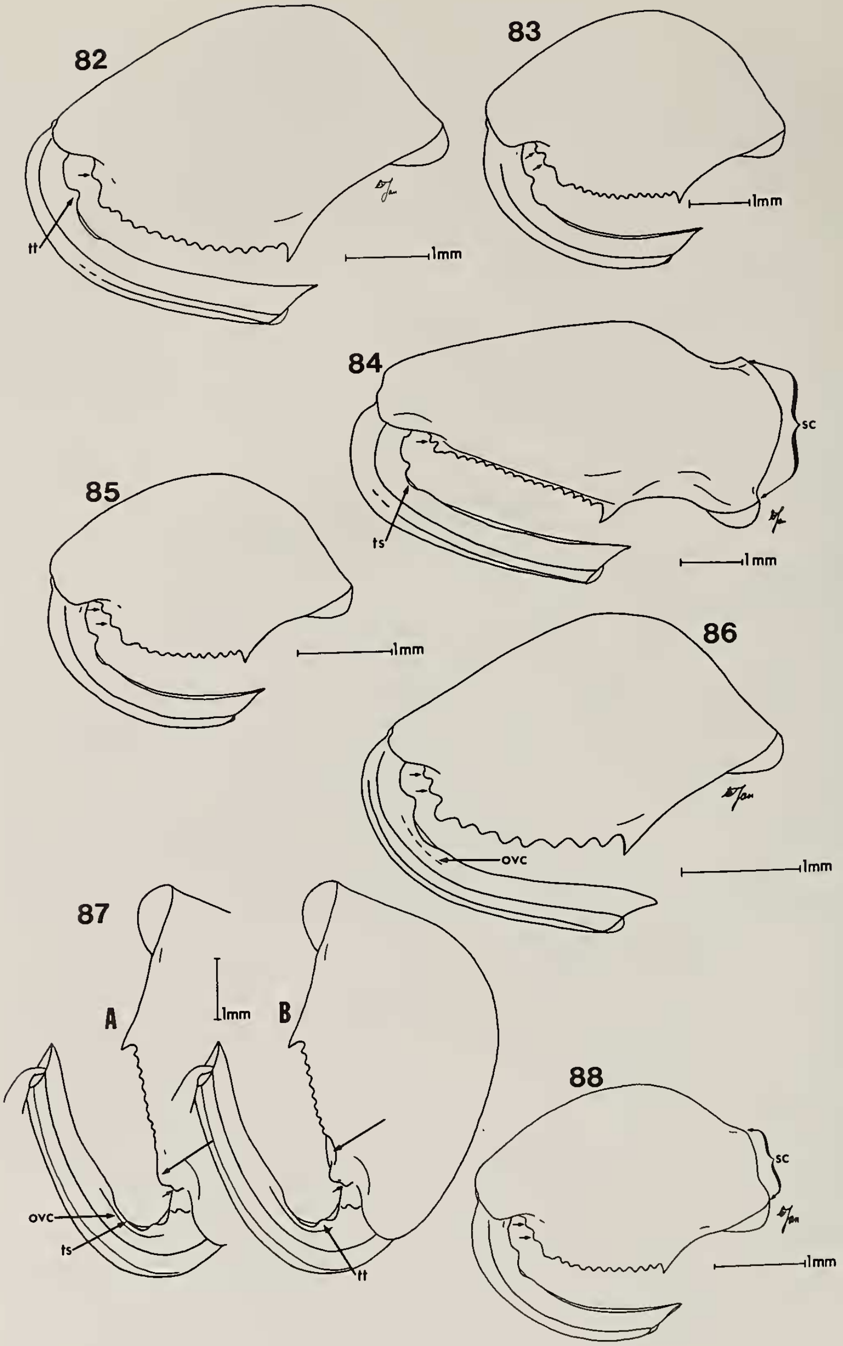
Figs. 58-67. 58-61, Ventral side of head showing variation in width of submentum: 58, *Pachymerus nucleorum* (Fabricius); 59, *P. sveni* Nilsson; 60, *P. bactris* (Linné); 61, *Speciomerus giganteus* (Chevrolat), note carina on the gena (arrow). 62-65, Pygidium of some species of Pachymerini: 62, *P. bactris*; 63, *P. sveni*; 64, *P. nucleorum*; 65, *Caryobruchus rubidus* (Chevrolat). 66, Lateral view of pygidium, *P. bactris*, male. 67, Pronotum and basal end of elytra of *P. nucleorum*. Abbreviations: fe = metafemur, hum = humerus, prd = pronotum disk, pyg = pygidium, s = submentum, ti = metatibia.



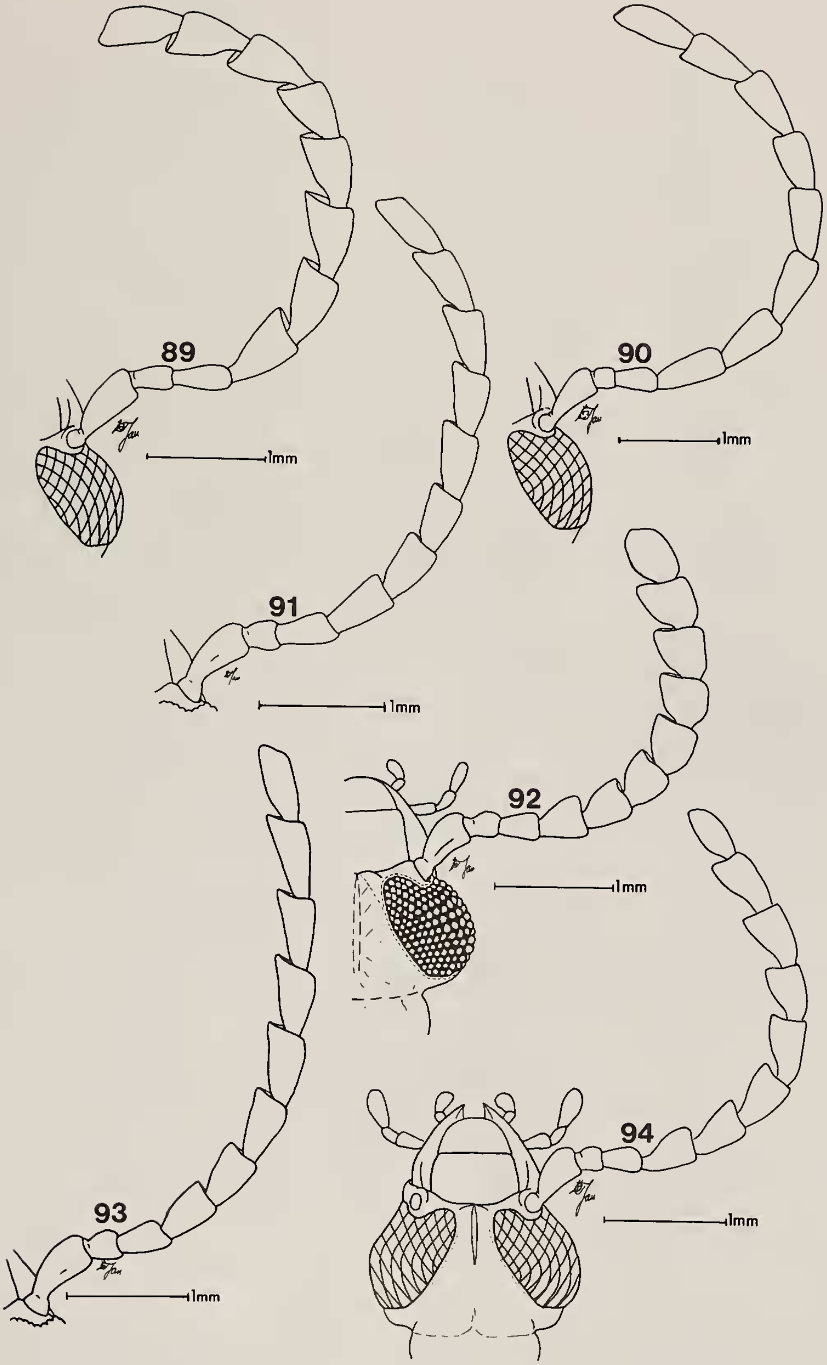
Figs. 68-74. Hind legs of Pachymerinae. 68, *Caryoborus gracilis* Nilsson. 69, *C. chiriquensis* Sharp. 70, A, *C. serripes* (Sturm); B. Detail of pecten with setae between denticles (arrow). Most pachymerine bruchids have these setae, but they are usually very short, fine and therefore hard to see (the setae have been removed from Figs. 68, - 70A). 71, *Speciomerus giganteus* (Chevrolat). 72, *S. ruficornis* (Germar). 73, *S. revoili* (Pic). 74, *S. rubrofemoralis* (Pic). Abbreviations: c = calcaria, d = denticle (on pecten), pro = protuberance, s = spine (on prepectenal ridge).



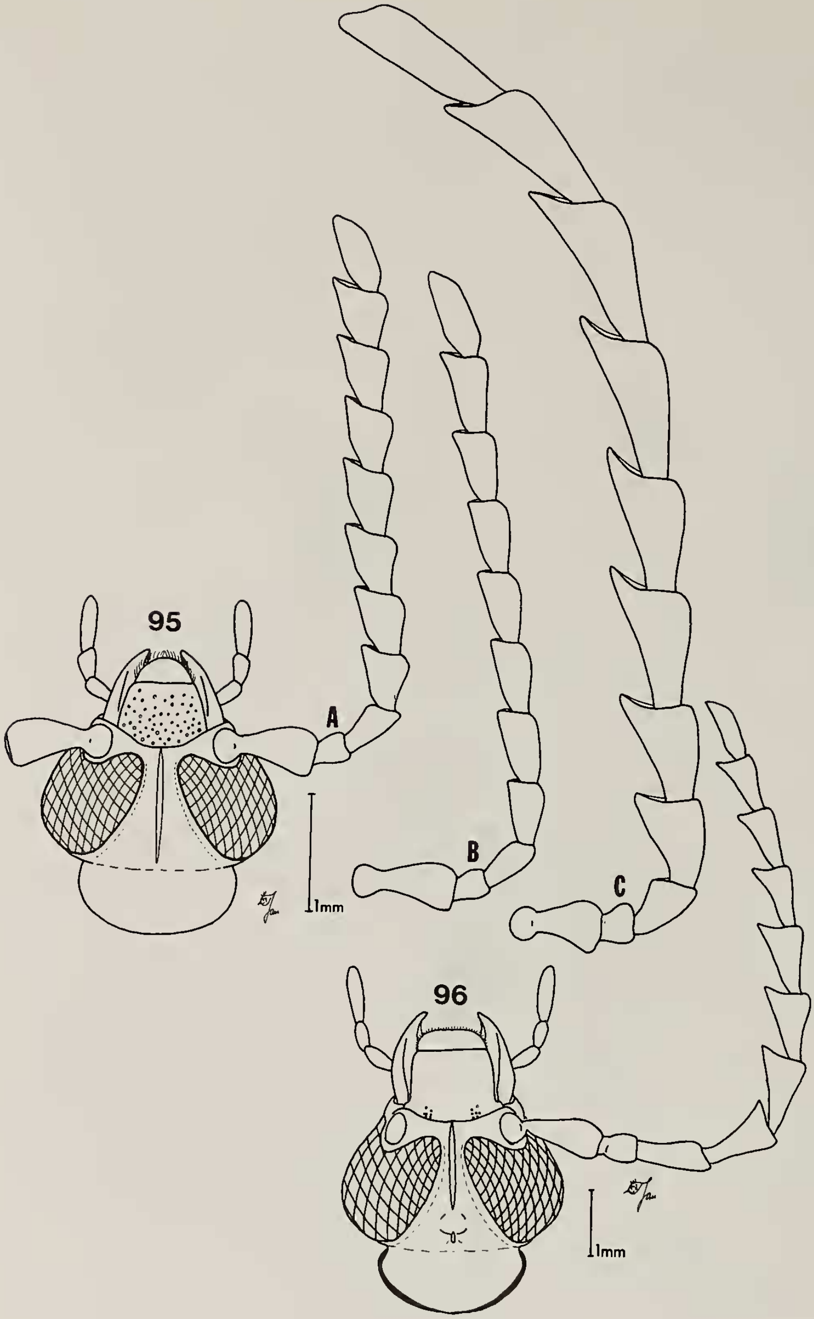
Figs. 75-81. Hind legs of Pachymerinae. 75, *Caryobruchus gleditsiae* (Johansson and Linné). 76, *C. marieae* (Nilsson and Johnson). 77, *C. veseyi* (Horn). 78, *C. curvipes* (Latreille). 79, *C. maya* Nilsson. 80, *C. rubidus* (Chevrolat). 81, *Pachymerus bridwelli* (Prevett).



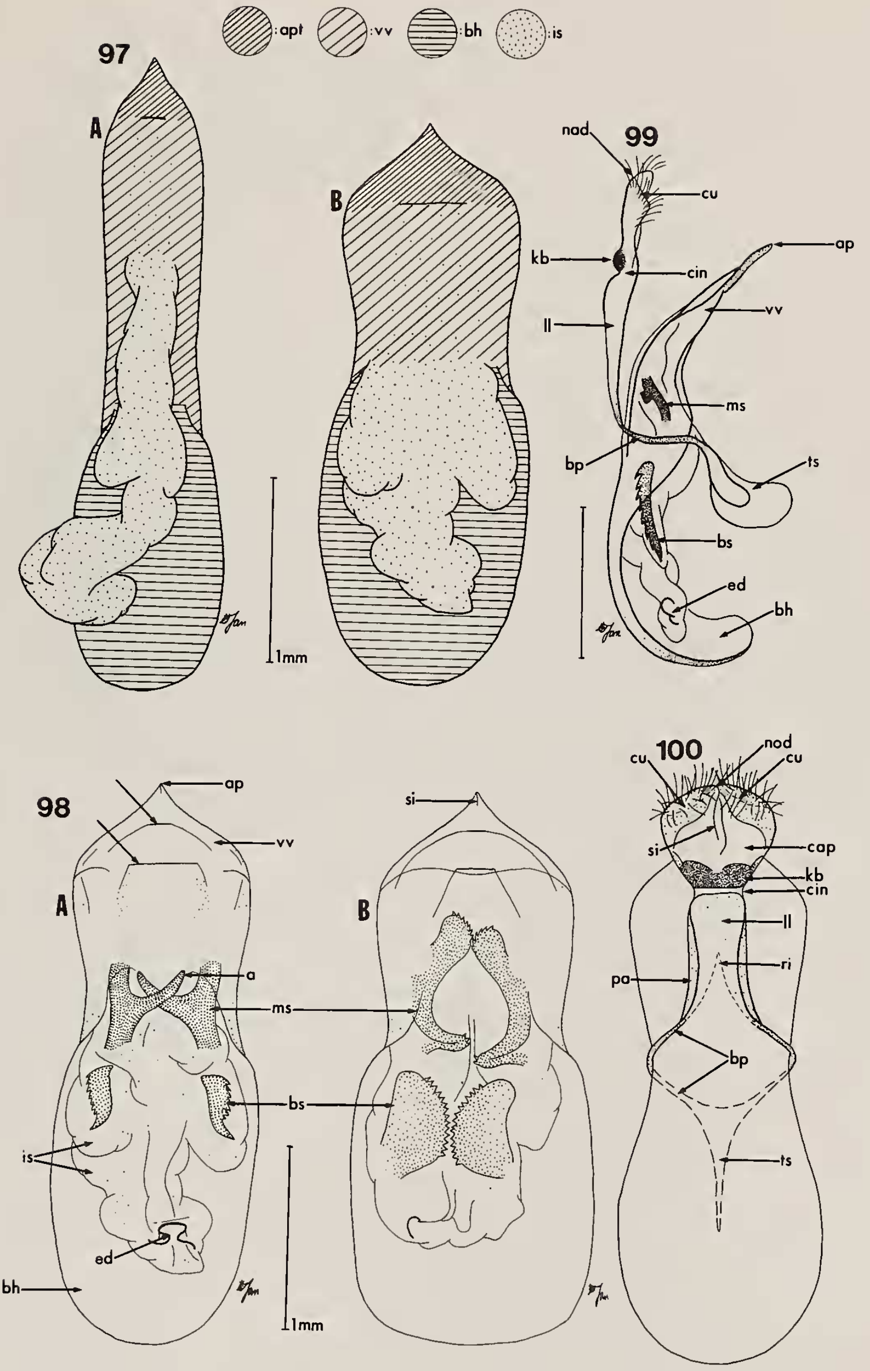
Figs. 82-88. Hind legs of Pachymerinae. 82, *Pachymerus bactris* (Linné), female (arrow = apical tubercle, tt = tibial tubercle). 83, *P. cardo* (Fåhraeus) (arrows = apical tubercles; this species has variable number of tubercles, 1-3 tubercles, but 2 tubercles appear to be more common). 84, *P. bactris*, male (arrow = apical tubercle, sc = sinuated carina, ts = tibial sulcus). 85, *P. abruptestriatus* (Gyllenhal) (arrows = apical tubercles). 86, *P. thoracicus* Prevett (small arrows = apical tubercles, ovc = outer ventral carina). 87, *P. nucleorum* (Fabricius): A. variation with large fused denticle (large arrow); B, variation with sulcus (large arrow, small arrow = apical tubercle, ovc = outer ventral carina, ts = tibial sulcus, tt = tibial tubercle). 88, *P. sveni* Nilsson (arrows = apical tubercles, sc = sinuated carina).



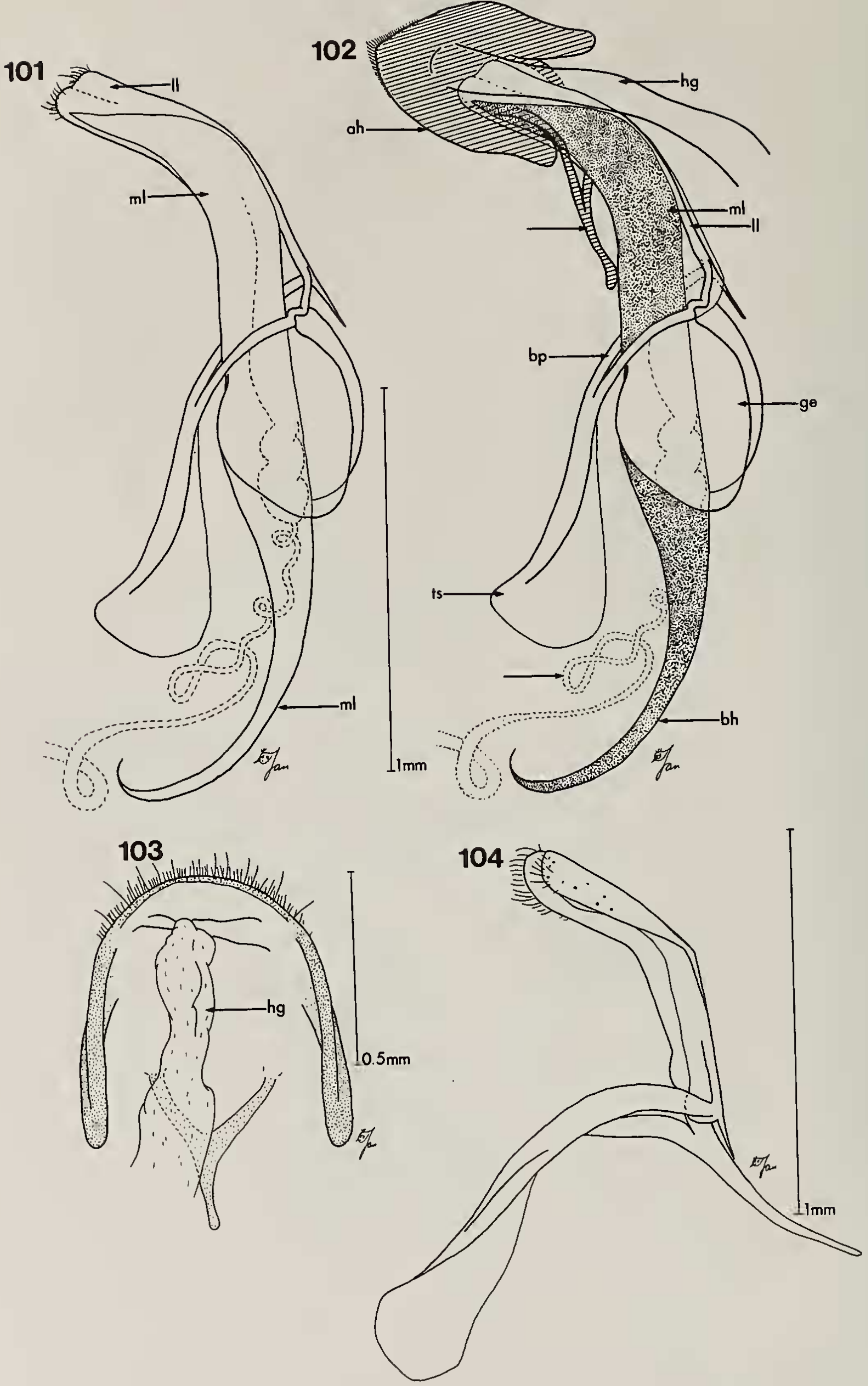
Figs. 89-94. Antennae of *Caryobruchus* Schönherr. 89, *C. curvipes* (Latreille). 90, *C. veseyi.* (Horn) 91, *C. gleditsiae* (Johansson and Linné). 92, *C. marieae* Nilsson and Johnson. 93, *C. maya* Nilsson. 94, *C. rubidus* (Chevrolat).



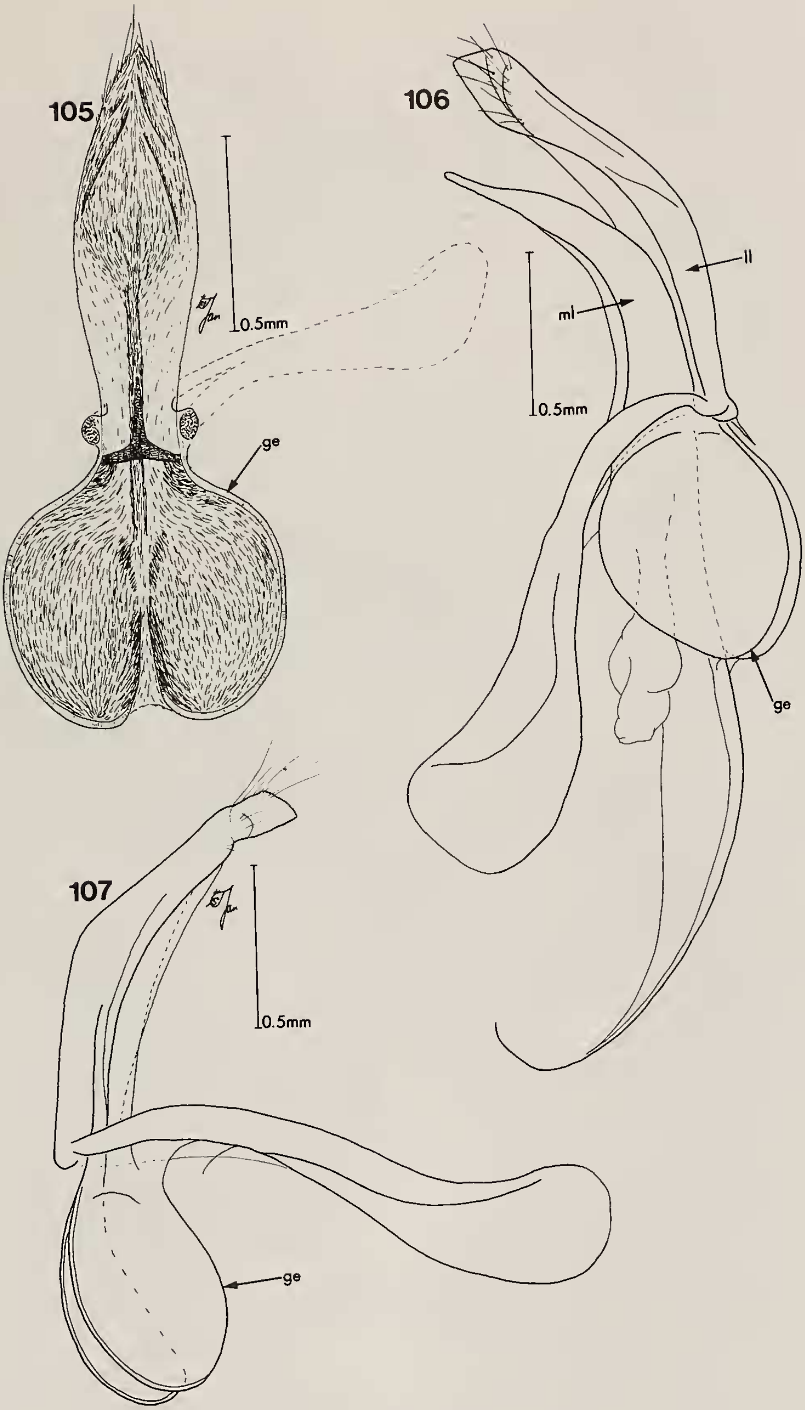
Figs. 95-96. 95, Antennae of *Caryoborus* Schönherr: A, *C. chiriquensis* Sharp; B, *C. gracilis* Nilsson; C, *C. serripes* (Sturm). 96, Antennae of *Speciomerus giganteus* (Chevrolat).



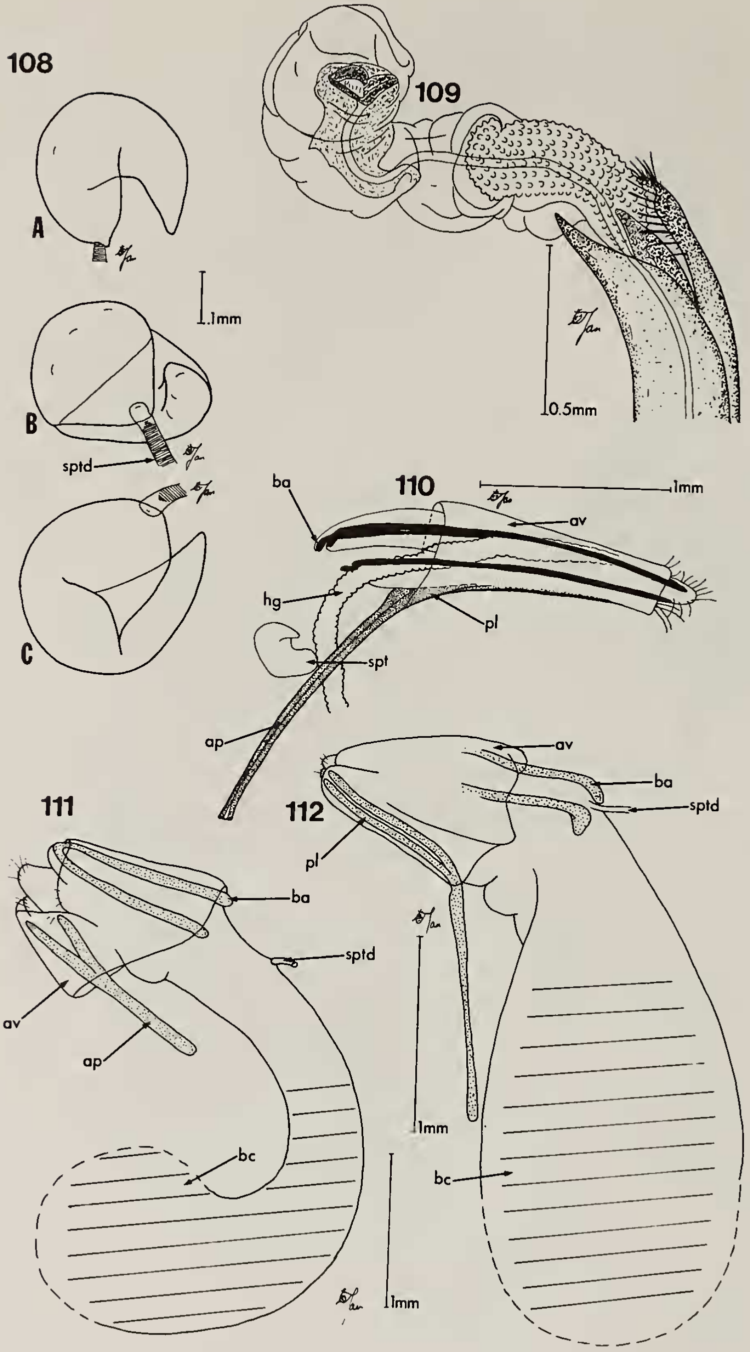
Figs. 97-100. 97, Sections of median lobe of male genitalia: A, *Caryoborus serripes* (Sturm); B, *Caryobruchus gleditsiae* (Johansson and Linné). 98, Parts of median lobe of male genitalia; A, *C. gleditsiae*; B, *C. curvipes* (Latreille): 99, Lateral view of median lobe and tegmen of *C. gleditsiae*. 100, Dorsal view of tegmen of *C. gleditsiae*: Abbreviations: a = apex of sclerite, ap = apex of median lobe, apt = apical triangle of the ventral valve, bh = basal hood, bs = basal sclerite, bp = basal piece, cap = caput, cin = cingulum, cu = cutis, ed = ejaculatory duct, is = internal sac, kb = Kingsolver's band, ll = lateral lobes, ms = median sclerite, nod = nodus, pa = pallium, ri = rima, si = sinus, ts = tegminal strut, vv = ventral valve.



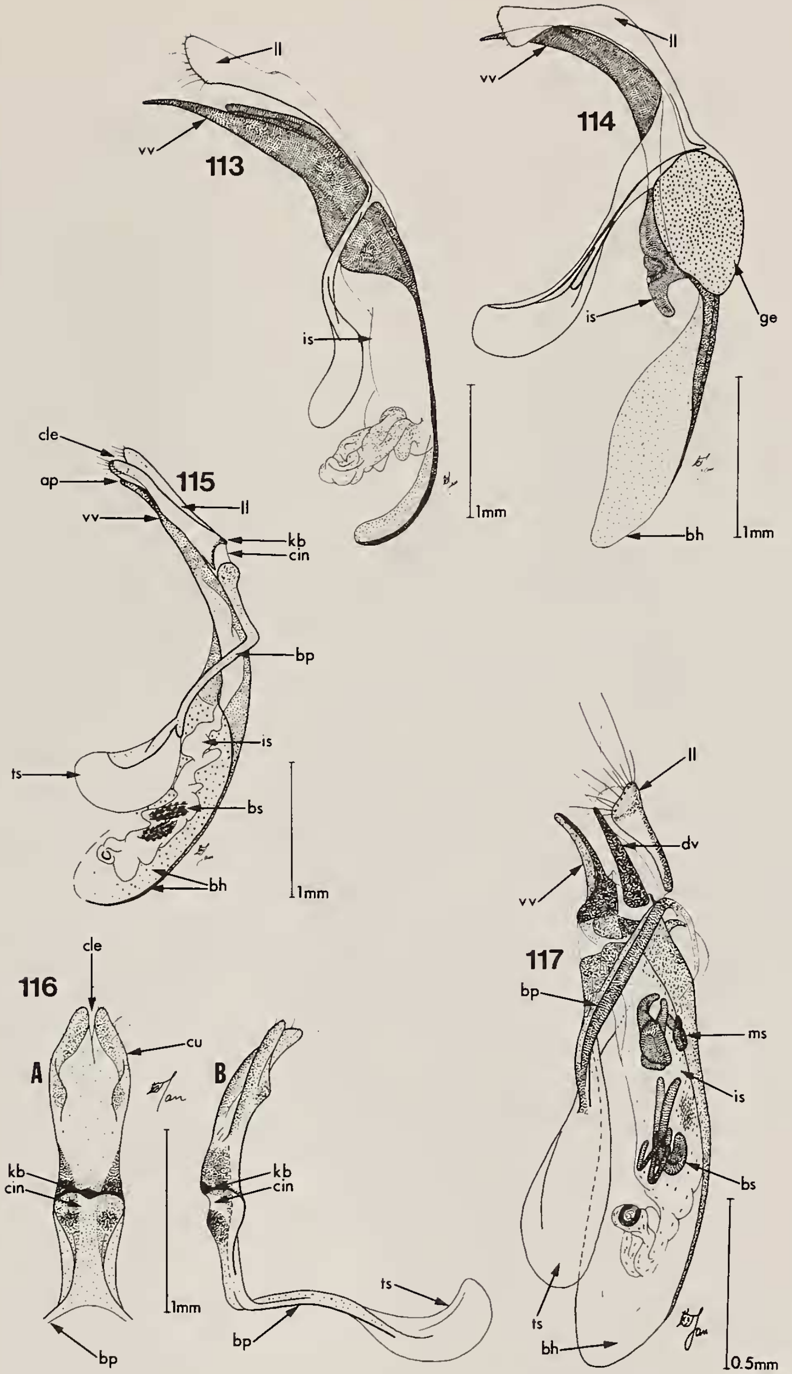
Figs. 101-104. 101, Male genitalia of *Pachymerus sveni* Nilsson, lateral view, without apical hood. 102, Same genitalia as in Fig. 101, with apical hood. 103, Apical hood of male genitalia of *P. sveni*, dorsal view. 104, Tegmen of *P. sveni*, lateral view, gemmae removed. Abbreviations: ah = apical hood, bh = basal hood, bp = basal piece, ge = gemma (pl. gemmae), hg = hind gut, ll = lateral lobes, ml = median lobe, ts = tegminal strut.



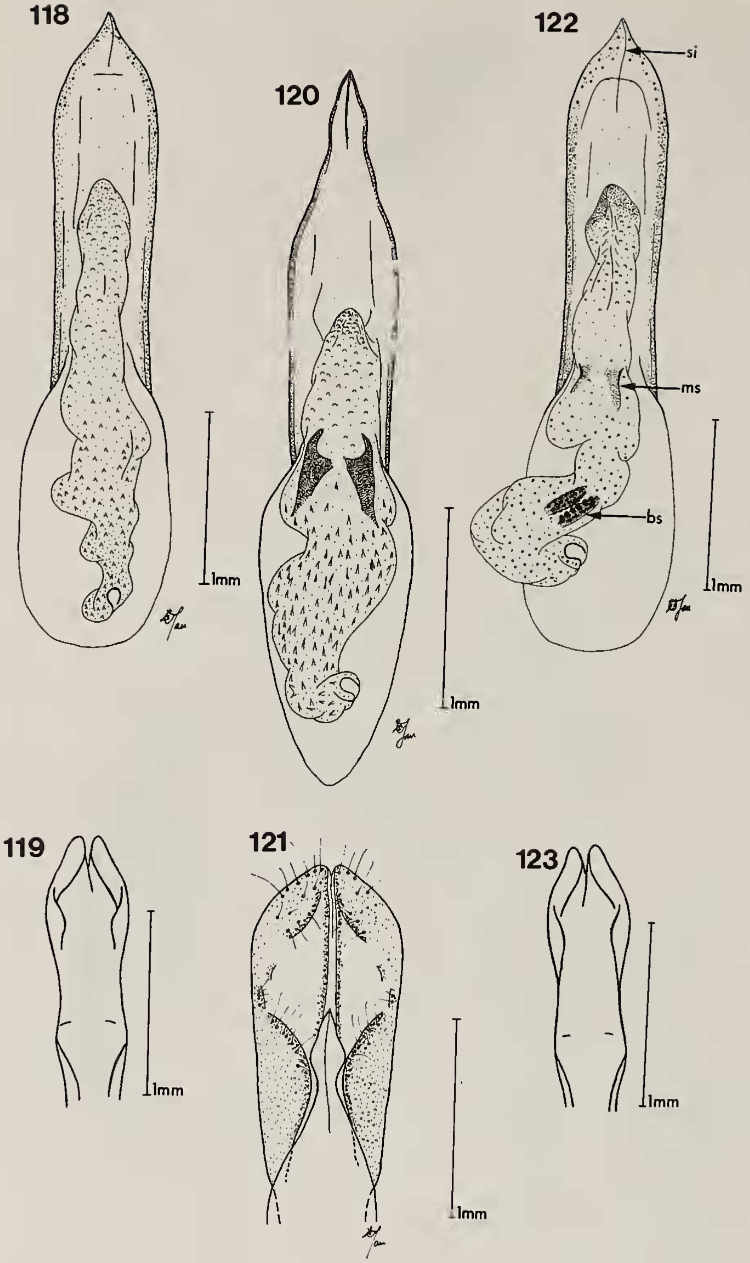
Figs. 105-107. Male genitalia of *Pachymerus bactris* (Linné). 105, Tegmen, gemmae removed (setae shown), dorsal view. 106, Median lobe and tegmen, with gemmae (setae not shown), lateral view. 107, Tegmen, with gemmae (setae not shown), lateral view. Abbreviations: ge = gemma (pl. gemmae), ml = median lobe, ll = lateral lobes.



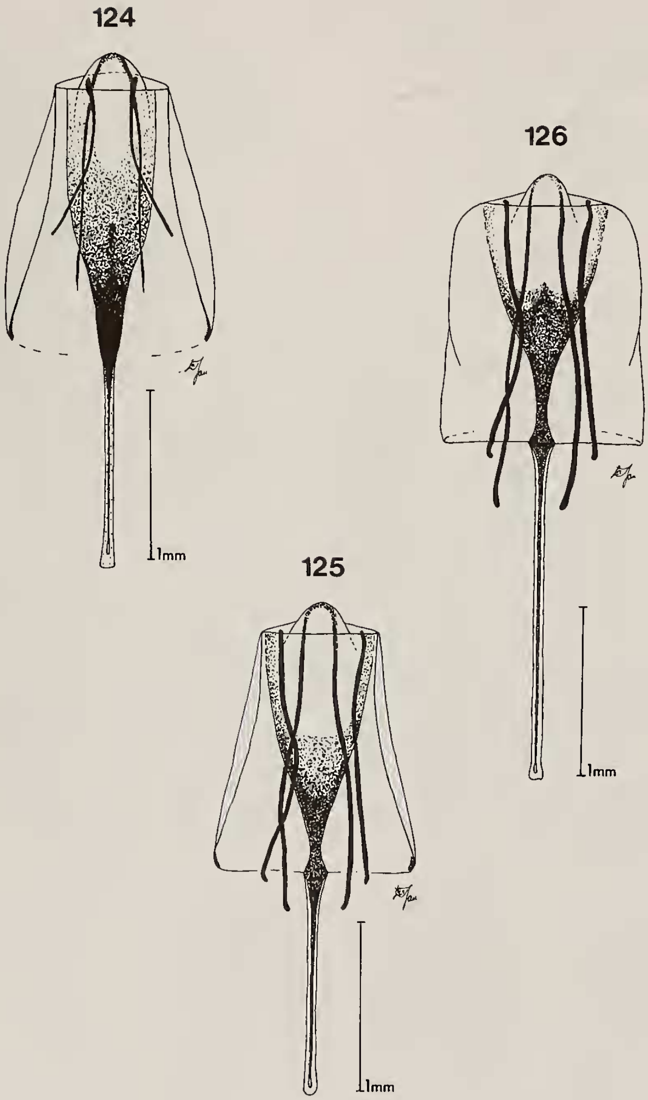
Figs. 108-112. 108, A - C, Spermatheca of *Pachymerus sveni* Nilsson, in different angles. 109, Median lobe of *P. cardo* (Fåhraeus) (everted). 110, Female genitalia of *P. sveni*, lateral view. 111, Female genitalia of *Caryobruchus* Bridwell, lateral view, area of sclerite location in the bursa copulatrix striped. 112, Female genitalia of *Speciomerus* Nilsson, lateral view, area of sclerite location in the bursa copulatrix striped. Abbreviations: ap = apodeme of spiculum gastrale (8th stenite), ba = baculum of 8th tergite, bc = bursa copulatrix, hg = hindgut, ov = ovipositor, pl = plate of spiculum gastrale (8th sternite), spt = spermatheca, sptd = spermathecal duct.



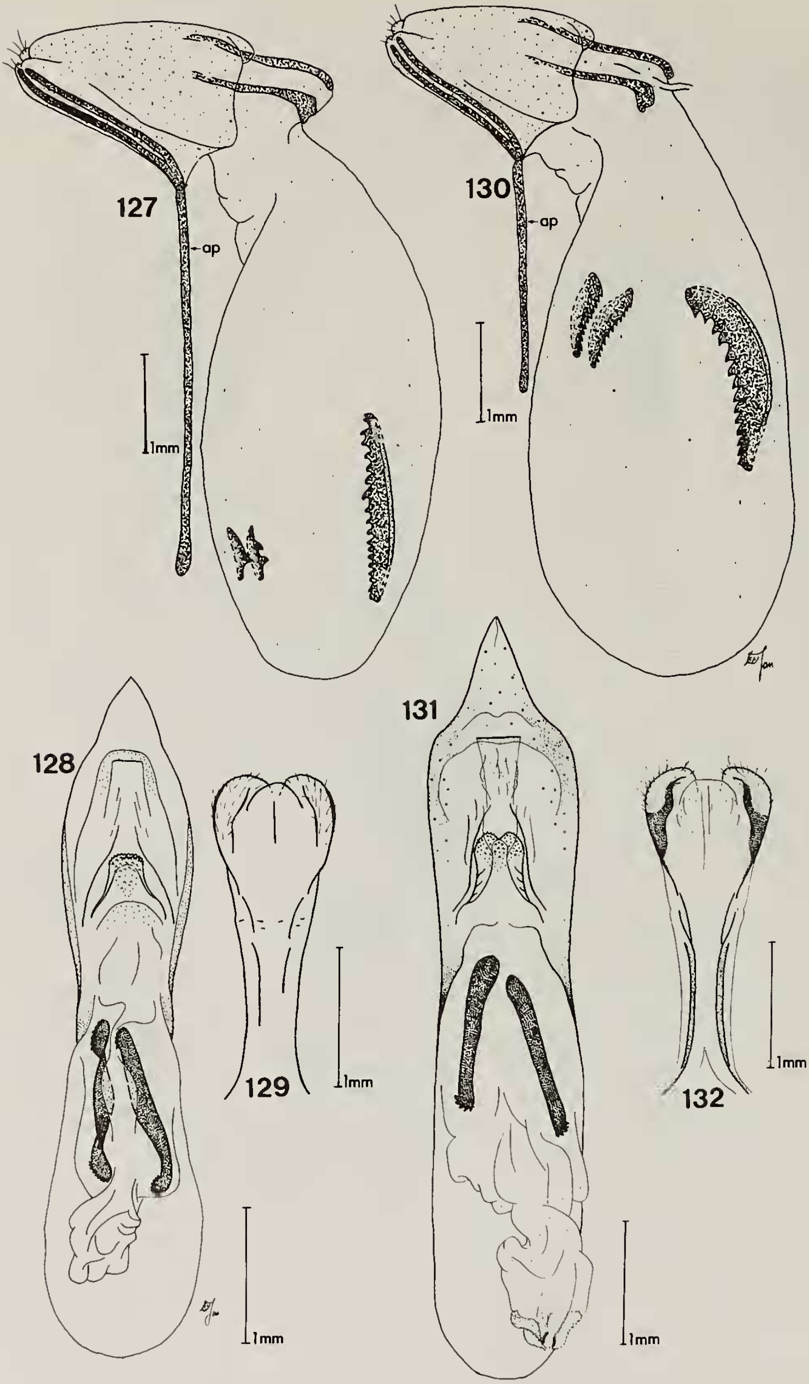
Figs. 113-117. Male genitalia. 113, Median lobe and tegmen of *Speciomerus rubrofemoralis* (Pic), lateral view (note absence of sclerites in the internal sac; dotted area = median lobe, white area = tegmen). 114, Median lobe and tegmen of *Pachymerus bridwelli* (Prevett), lateral view (note absence of sclerites in the internal sac; dotted area = median lobe, white area = tegmen). 115, *Caryoborus serripes* (Sturm), median lobe and tegmen, lateral view. 116, *Caryoborus serripes*: A, Lateral lobes (basal piece and tegminal strut removed), dorsal view; B, Tegmen (basal piece and tegminal strut included), lateral view. 117, Median lobe and tegmen of *Caryedon serratus* (Olivier) (note dorsal valve; also see Fig. 189). Abbreviations: ap = apex of median lobe, bh = basal hood, bp = basal piece, bs = basal sclerite, cin = cingulum, cle = cleft, cu = cutis, dv = dorsal valve, ge = gemma, is = internal sac, kb = Kingsolver's band, ll = lateral lobes, ms = median sclerites, ts = tegminal strut, vv = ventral valve.



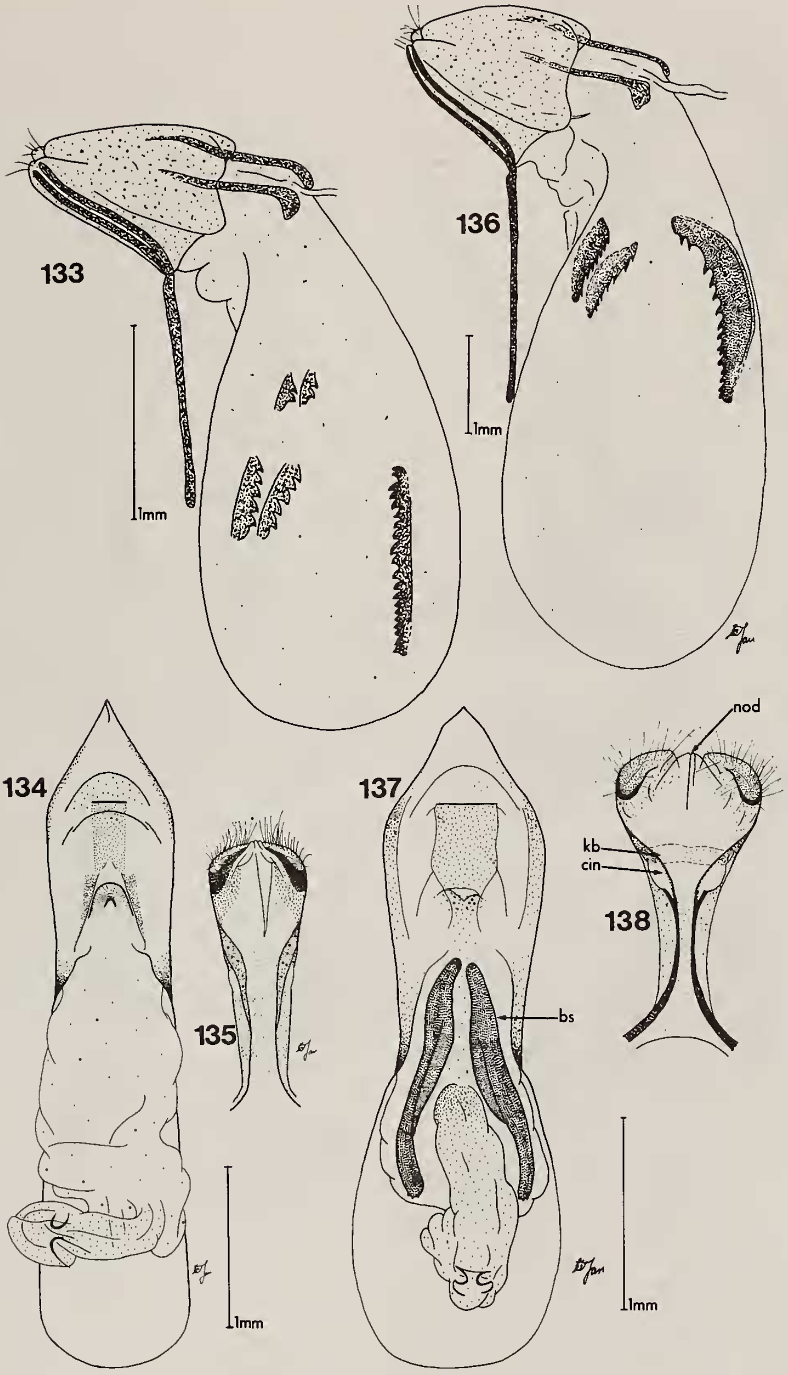
Figs. 118-123. Male genitalia of *Caryoborus* Schönherr. 118, *C. chiriquensis* Sharp, median lobe. 119, *C. chiriquensis*, lateral lobes. 120, *C. gracilis* Nilsson, median lobe. 121, *C. gracilis*, lateral lobes. 122, *C. serripes* (Sturm), median lobe. 123, *C. serripes*, lateral lobes. Abbreviations: bs = basal sclerites, ms = median sclerites, si = sinus.



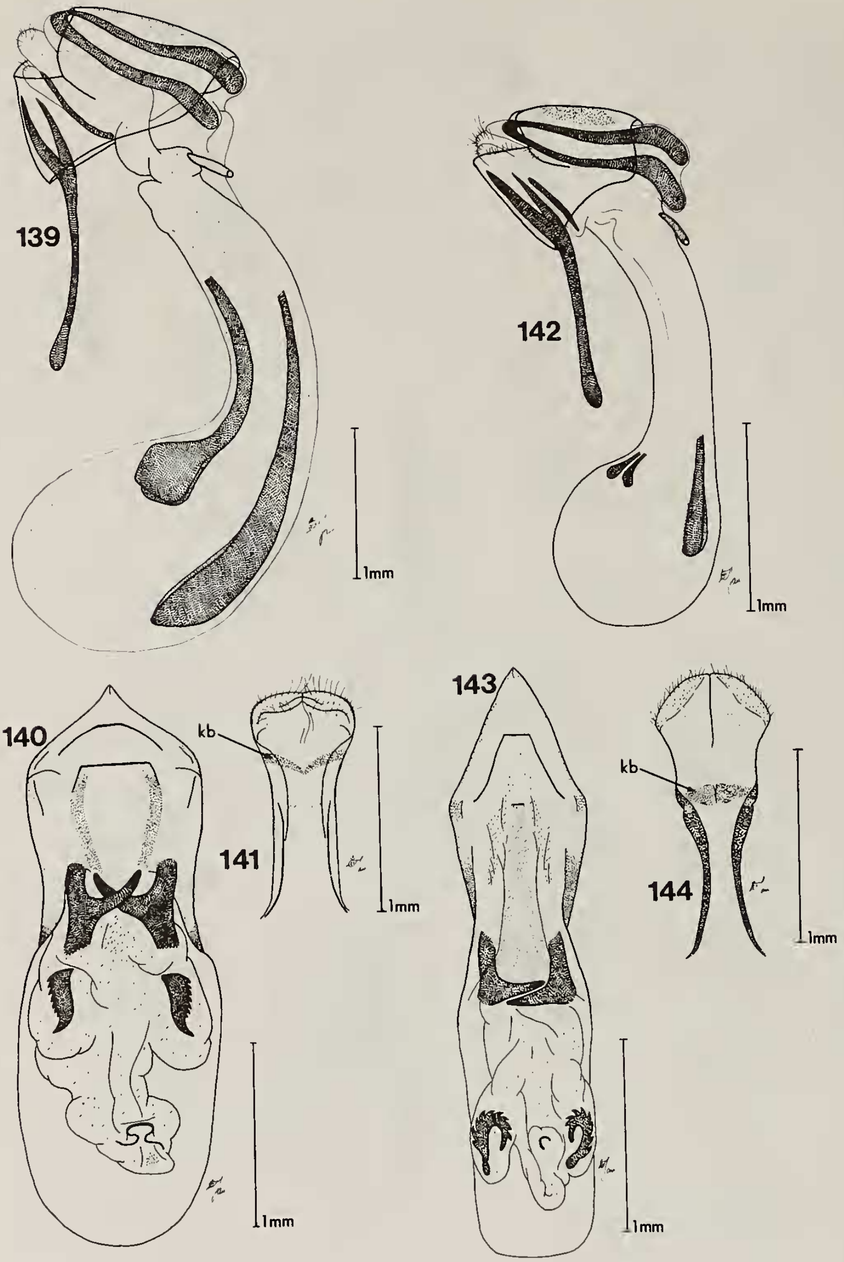
Figs. 124-126. Female genitalia of *Caryoborus* Schönherr. 124, *C. chiriquensis* Sharp. 125, *C. gracilis* Nilsson. 126, *C. serripes* (Sturm).



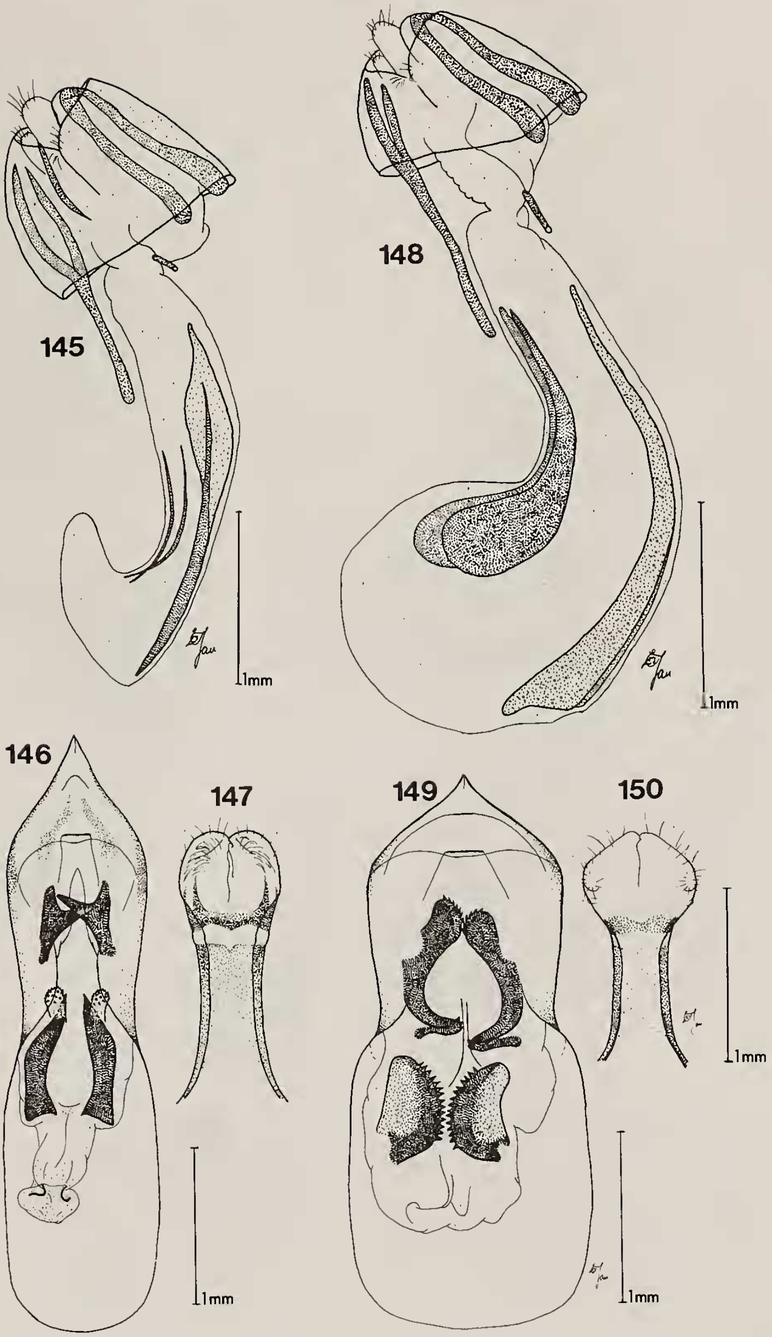
Figs. 127-132. Genitalia of *Speciomerus* Nilsson. 127, *S. giganteus* (Chevrolat), female. 128, *S. giganteus*, median lobe. 129, *S. giganteus*, lateral lobes. 130, *S. ruficornis* (Germar), female. 131, *S. ruficornis*, median lobe. 132, *S. ruficornis*, lateral lobes. Abbreviation: ap = apodeme of spiculum gastrale.



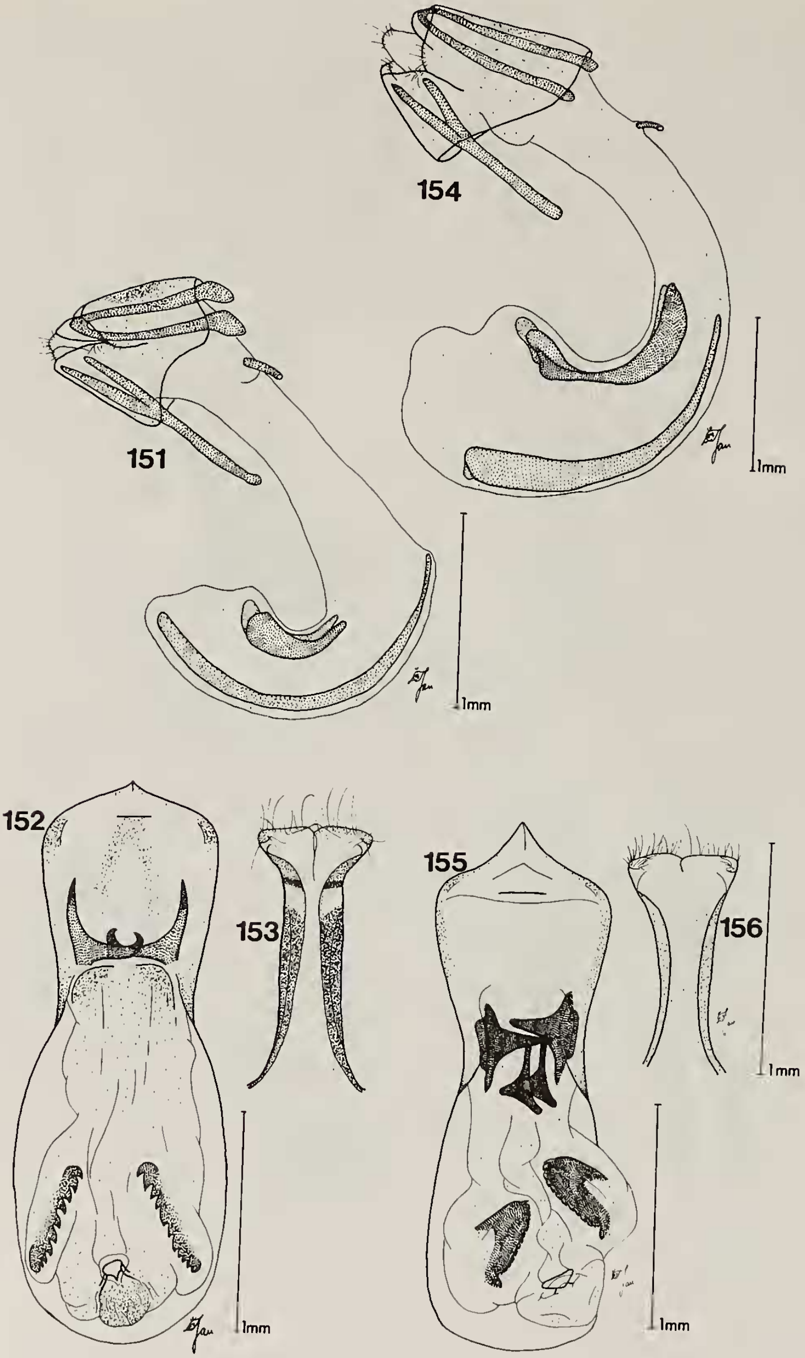
Figs. 133-138. Genitalia of *Speciomerus* Nilsson. 133, *S. rubrofemoralis* (Pic), female. 134, *S. rubrofemoralis*, median lobe. 135, *S. rubrofemoralis*, lateral lobes. 136, *S. revoili* (Pic), female. 137, *S. revoili*, median lobe. 138, *S. revoili*, lateral lobes. Abbreviations: bs = basal sclerite, cin = cingulum, kb = Kingsolver's band, nod = nodus.



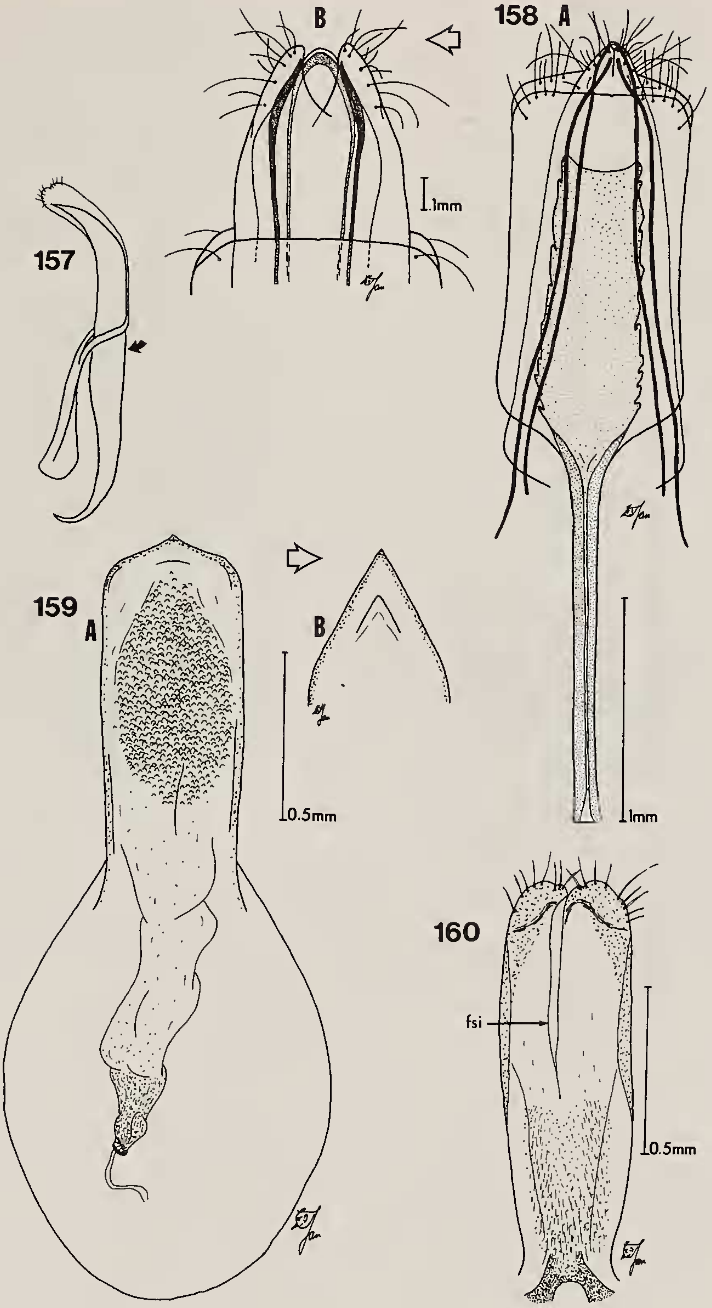
Figs. 139-144. Genitalia of *Caryobruchus* Bridwell. 139, *C. gleditsiae* (Johansson and Linné), female. 140, *C. gleditsiae*, median lobe. 141, *C. gleditsiae*, lateral lobes. 142, *C. marieae* Nilsson and Johnson, female. 143, *C. marieae*, median lobe. 144, *C. marieae*, lateral lobes. Abbreviation: kb = Kingsolver's band.



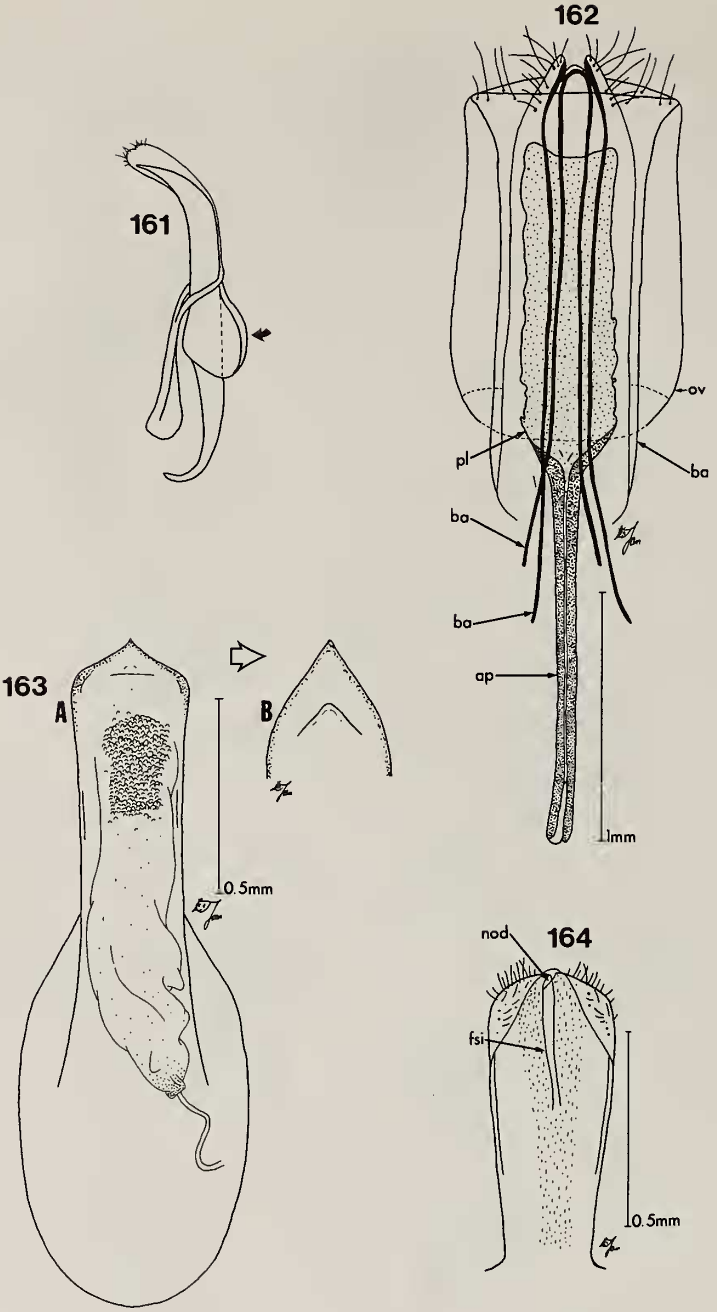
Figs. 145-150. Genitalia of *Caryobruchus* Bridwell. 145, *C. veseyi* (Horn), female. 146, *C. veseyi*, median lobe. 147, *C. veseyi*, lateral lobes. 148, *C. curvipes* (Latreille), female. 149, *C. curvipes*, median lobe. 150, *C. curvipes*, lateral lobes.



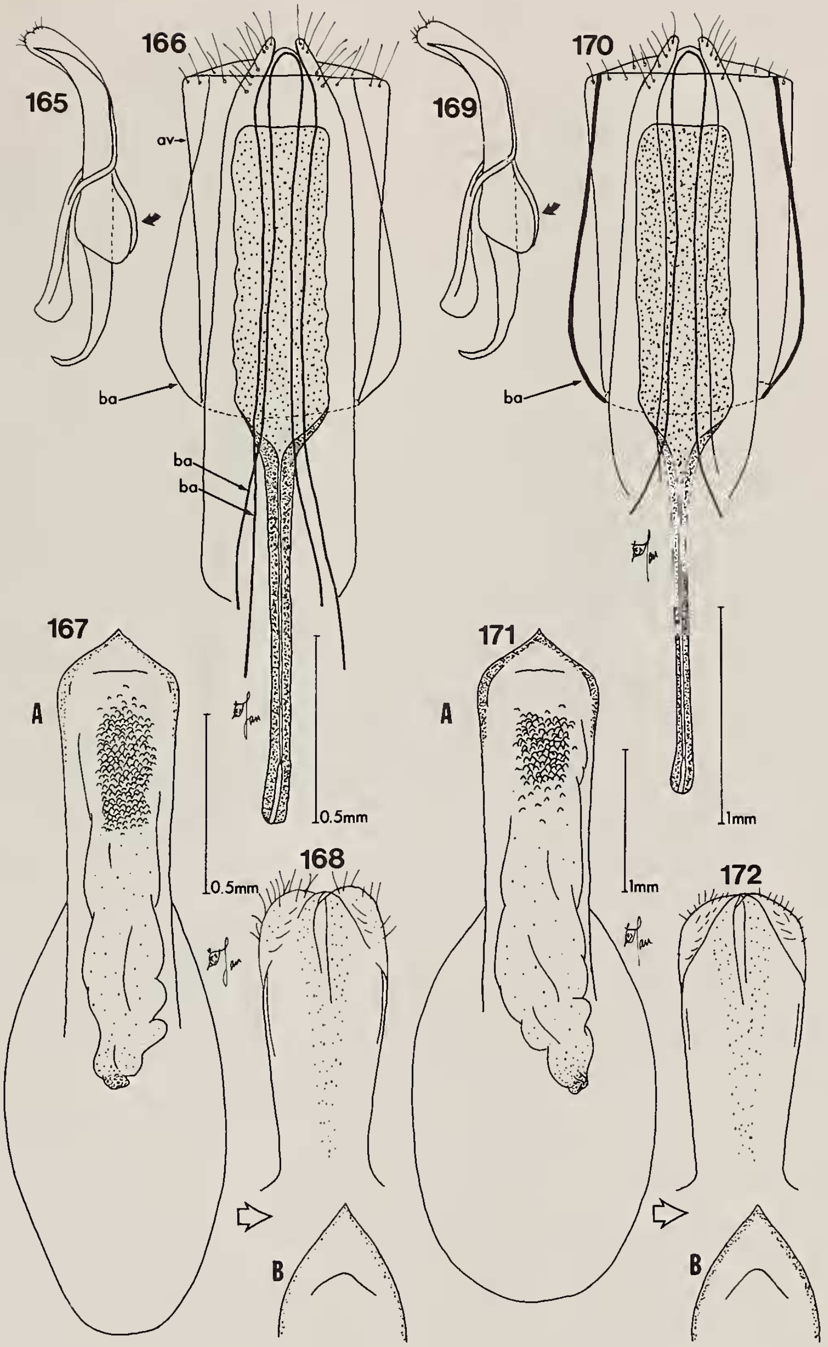
Figs. 151-156. Genitalia of *Caryobruchus* Bridwell. 151, *C. maya* Nilsson, female. 152, *C. maya*, median lobe. 153, *C. maya*, lateral lobes. 154, *C. rubidus* (Chevrolat), female. 155, *C. rubidus*, median lobe. 156, *C. rubidus*, lateral lobes.



Figs. 157-160. Genitalia of *Pachymerus cardo* (Fåhraeus). 157, Profile of male genitalia, note absence of gemmae (arrow). 158, A, Female genitalia; B, Detail of ovipositor apex. 159, A, Median lobe of male; B, Detail of median lobe apex. 160, Lateral lobes. Abbreviation: fsi = foldlike sinus.



Figs. 161-164. Genitalia of *Pachymerus sveni* Nilsson. 161, Profile of male genitalia, note gemmae (arrow). 162, Female genitalia. 163, A, Median lobe; B, Detail of median lobe apex. 164, Lateral lobes. Abbreviations: ap = apodeme of spiculum gastrale, ba = baculum, fsi = foldlike sinus, nod = nodus, ov = ovipositor, pl = plate of spiculum gastrale.



Figs. 165-172. Genitalia of *Pachymerus* Thunberg. 165, *P. abruptestriatus* (Gyllenhal), profile of male genitalia, note gemmae (arrow). 166, *P. abruptestriatus*, female genitalia. 167, A, *P. abruptestriatus*, median lobe; B, Detail of apex. 168, *P. abruptestriatus*, lateral lobes. 169, *P. nucleorum* (Fabricius), profile of male genitalia, note gemmae (arrow). 170, *P. nucleorum*, female genitalia. 171, A, *Pachymerus nucleorum*, median lobe. B, Detail of apex. 172, *P. nucleorum*, lateral lobes. Abbreviations: ba = baculum, ov = ovipositor.

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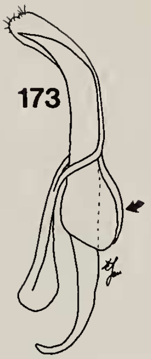

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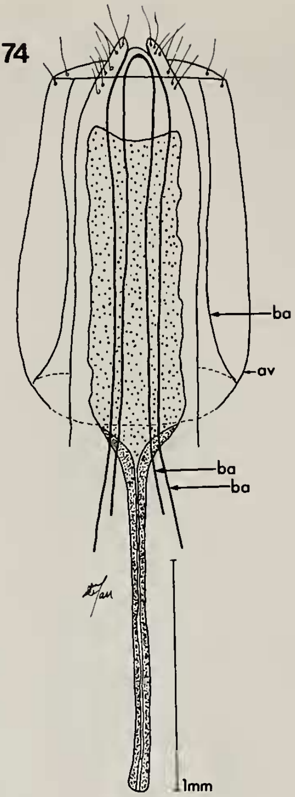

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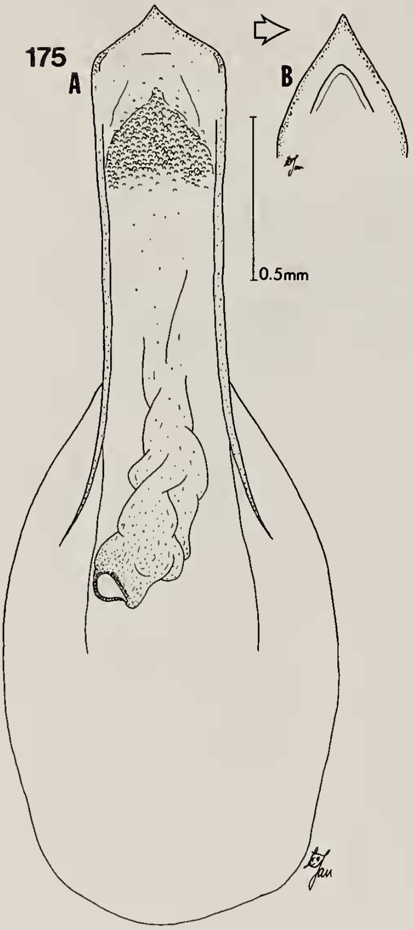

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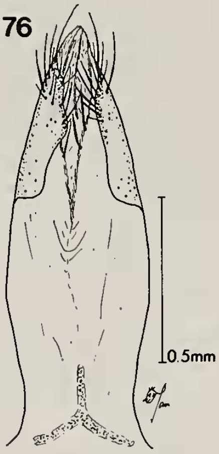

Figs. 173-176. Genitalia of *Pachymerus bactris* (Linné). 173, Profile of male genitalia, note gemmae (arrow). 174, Female genitalia. 175, A, Median lobe; B, Detail of apex. 176, Lateral lobes. Abbreviations: ba = baculum, ov = ovipositor.

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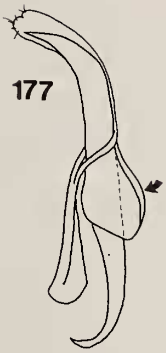

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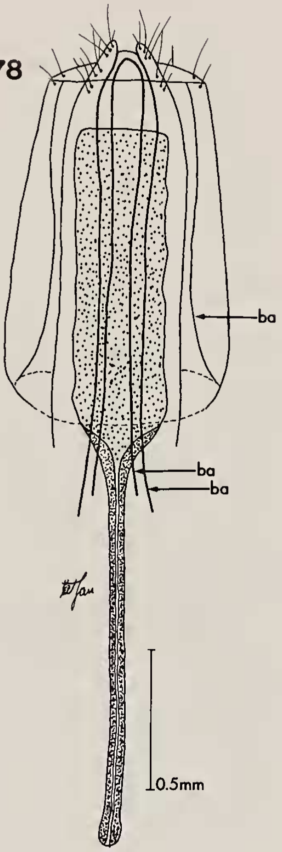

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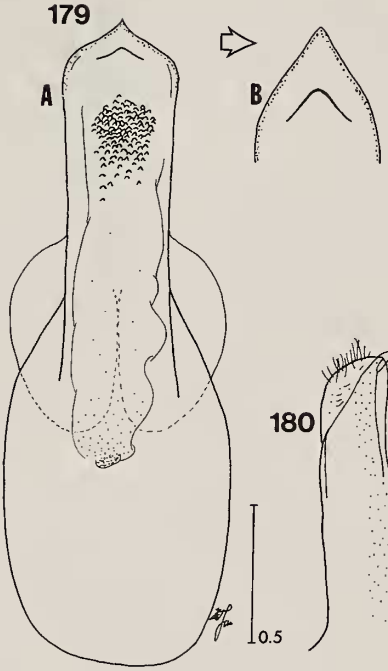

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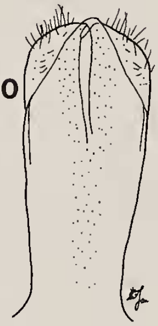
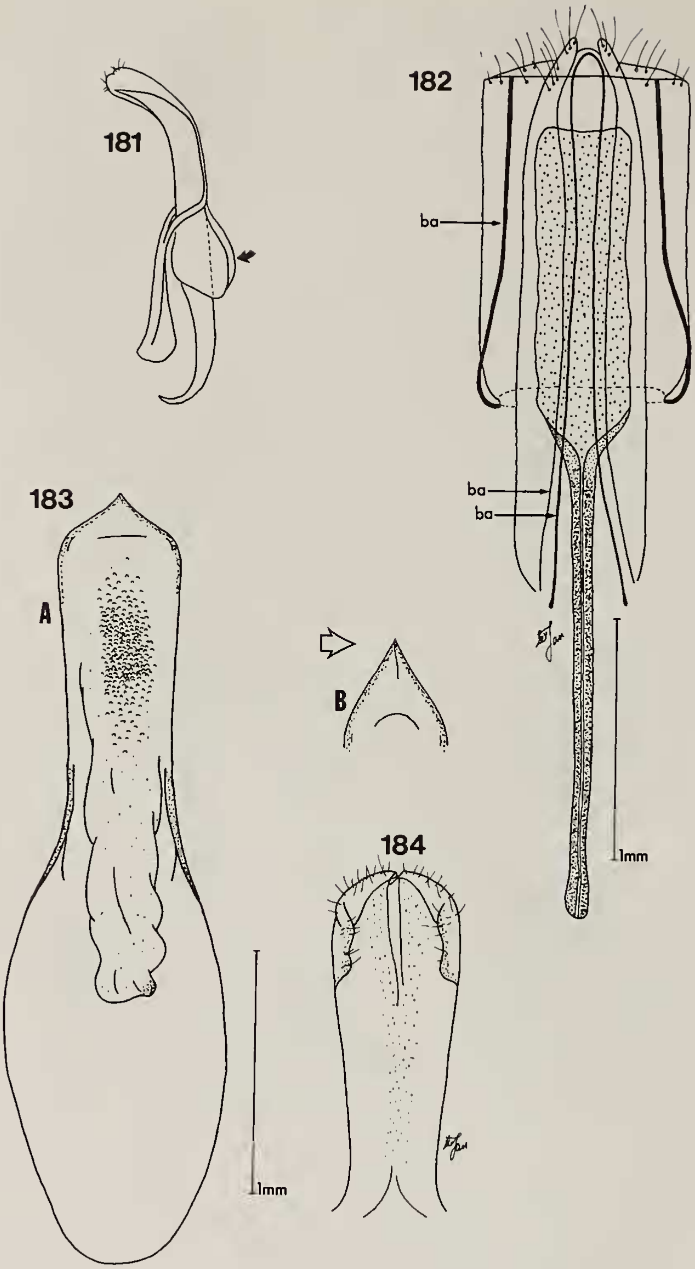
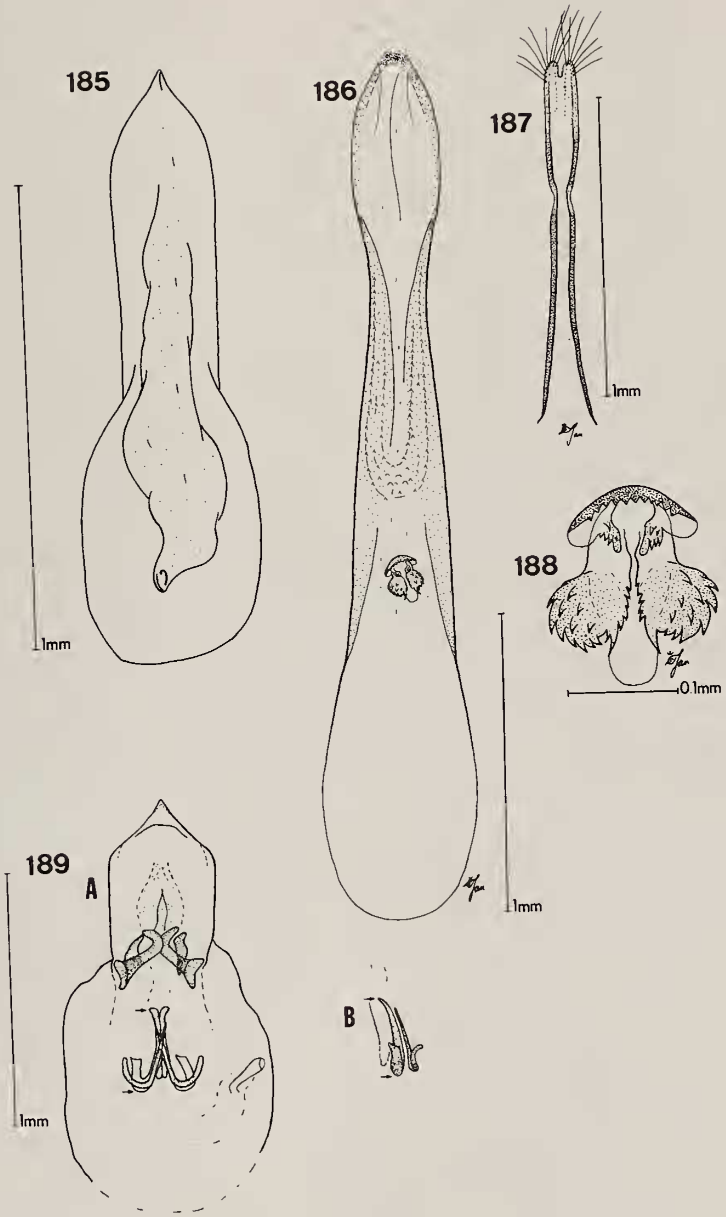


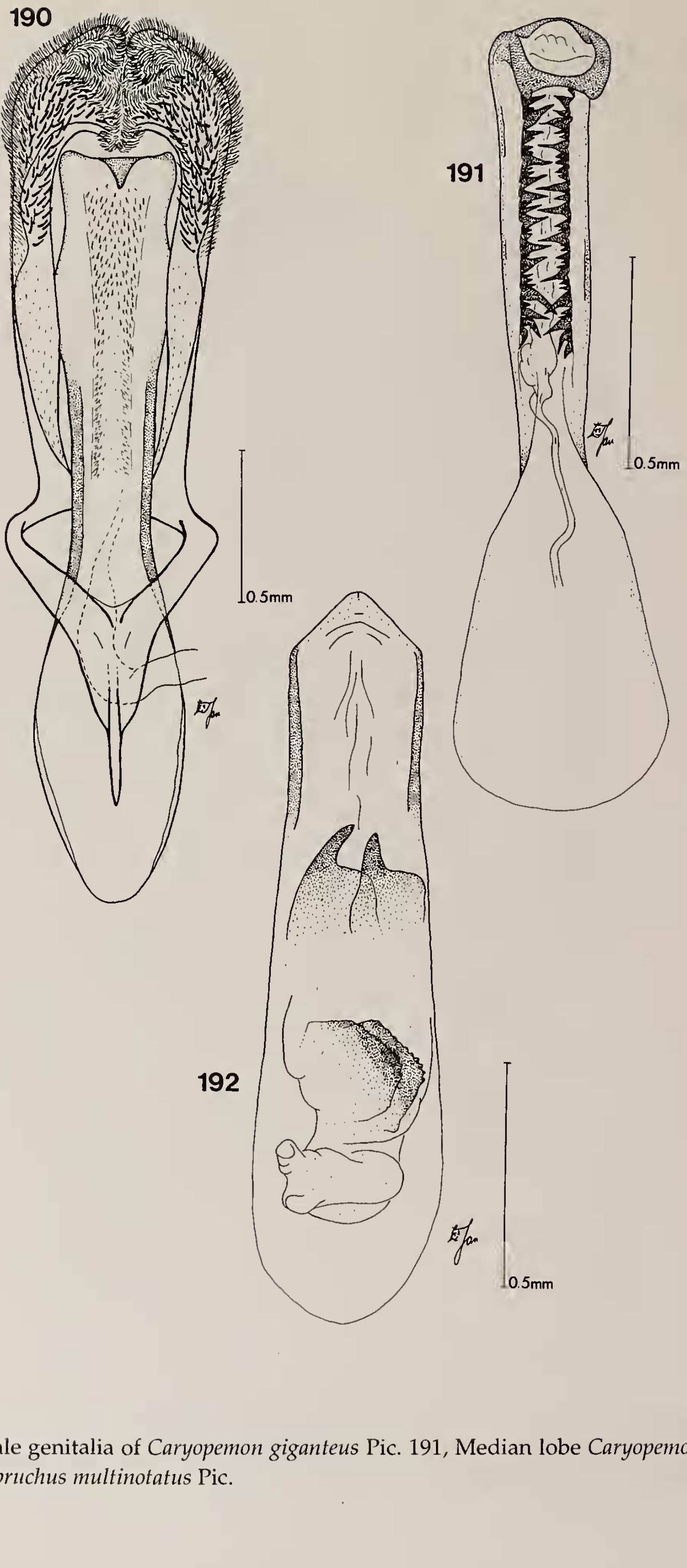
Figs. 177-180. Genitalia of *Pachymerus thoracicus* Prevett. 177, Profile of male genitalia, note gemmae (arrow). 178, Female genitalia. 179, A, Median lobe; B, Detail of apex. 180, Lateral lobes. Abbreviations: ba = baculum.



Figs. 181-184. Genitalia of *Pachymerus bridwelli* (Prevett). 181, Profile of male genitalia, note gemmae (arrow). 182, Female genitalia. 183, A, Median lobe; B, Detail of apex. 184, Lateral lobes. Abbreviation: ba = baculum.



Figs. 185-189. 185, Median lobe *Afroredon* Decelle. 186, Median lobe of *Exoctenophorus deflexicollis* Decelle. 187, Lateral lobes *E. deflexicollis*. 188, Detail of sclerite of *E. deflexicollis*. 189, A, Median lobe *Caryedon* Schönherr (also see Fig. 117); B, Detail of basal sclerites (lateral view).



Figs. 190-192. 190, Male genitalia of *Caryopemon giganteus* Pic. 191, Median lobe *Caryopemon luteonotatus* Pic. 192, Median lobe of *Diegobruchus multinotatus* Pic.